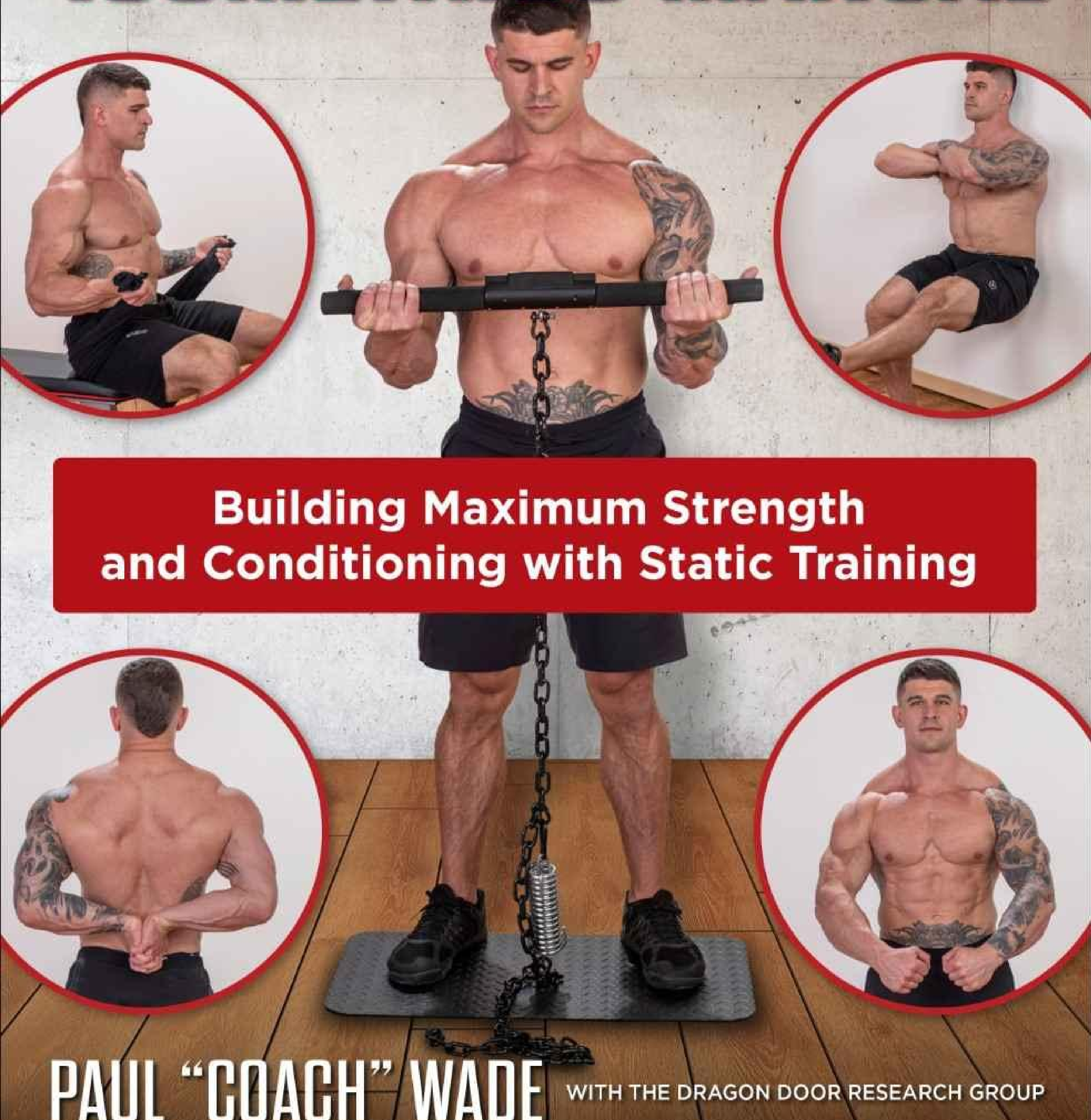
THE ULTIMATE ISOMETRICS MANUAL



Building Maximum Strength and Conditioning with Static Training

PAUL "COACH" WADE WITH THE DRAGON DOOR RESEARCH GROUP

Advance Praise for *The Ultimate Isometrics Manual*

"The Ultimate Isometrics Manual is the most comprehensive resource on isometrics training to date. Whether you're a beginner or an advanced lifter looking to develop new muscle and strength, this terrific book covers all the programming strategies you'll need, as well as the science to back it up."

—DR. CHAD WATERBURY, *AUTHOR OF HUGE IN A HURRY*

"Isometric training is the most underestimated, misunderstood but powerful method out there. And because very few of you have been using them (or using them optimally) everyone who applies the knowledge in this book will get rapid and impressive gains. I have been using isometrics for over 20 years; yet when I read *The Ultimate Isometrics Manual* I had to read with a note book and pen (yep, I'm old school) because I learned so much new information. It's a gold mine of practical and theoretical info presented in a clear and fun to read manner."

—CHRISTIAN THIBAUDEAU, STRENGTH & CONDITIONING COACH, AUTHOR, INTERNATIONAL SPEAKER

"The OG of the Old School has done it again! Paul 'Coach' Wade, the world's foremost authority on equipment free (or equipment light) training has compiled the most comprehensive, detailed and well-researched literature on isometric training that this planet has ever seen.

In classic 'Coach' form, Mr. Wade breaks down the science, history, warm-ups, programs and progressions into a single, definitive work of pure power and genius. Whether you're a bodybuilder, street workout

aficionado, powerlifter or average Joe, you will find something amazing within these pages. Highly recommended!"

—DANNY KAVADLO, CO-AUTHOR OF *GET STRONG*

"I never really thought that "not moving" a muscle while loading it would result in an appreciable amount of strength, hypertrophy or athleticism, but after beginning to implementing high force and maximum tension isometric exercises into my own routine, I've been astounded at what isometrics can accomplish for full body results. I can't recommend *The Ultimate Isometrics Manual* highly enough for decoding exactly how to use isometrics to enhance your own routine, transform your body and blast your strength through the roof!"

—BEN GREENFIELD, AUTHOR OF *BOUNDLESS*

"*The Ultimate Isometrics Manual* is an amazing read for both studious researchers and diligent athletes. I believe isometrics is the perfect soul mate for progressive calisthenics. I learned so much and I can't recommend it enough!"

—HAMPTON LIU, HYBRID CALISTHENICS

"Resistance to fatigue and stress is a key biological principle of adaptation to hardship, which is essential to the survival of all species. *The Ultimate Isometric Manual* taps into this principle with the mission to maximize strength along with other benefits of exercise on the body, offering a workout manual that can be used by anyone at any time without the need for a gym space or related equipment. This book fills a void in today's fitness world which generally lacks true principles."

—ORI HOFMEKLER, AUTHOR OF *THE WARRIOR DIET*

"Isometrics training is the single most effective training discipline I've ever used and *The Ultimate Isometrics Manual* is the best book I've read on the topic. Whether you're just starting out or a seasoned athlete,

Isometrics are the ultimate training hack to unleash your full potential. To ignore this book is to ignore a substantial amount of your potential to build muscle, strength, and athletic performance. *The Ultimate Isometrics Manual* should be required reading for every athlete and fitness enthusiast.”

—MATT SCHIFFERLE, AUTHOR OF ***GRIND STYLE CALISTHENICS***

THE ULTIMATE ISOMETRICS MANUAL

Building Maximum Strength and Conditioning with Static Training

PAUL "COACH" WADE

WITH THE DRAGON DOOR RESEARCH GROUP

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DISCLAIMER

All forms of resistance training are strenuous by nature. Isometrics in particular can be demanding on the cardiovascular system. No individual should attempt to follow an isometric training routine, or to apply any of the techniques and methods described in this manual, without first being cleared to do so by their physician.

The authors and publishers of this manual are not responsible in any form for any injury which may occur as a result of following the instructions therein. The exercises and methods described in this book can be strenuous. Please apply due care during all physical training, and never attempt to train or coach another individual unless you are fully licensed and insured to do so.

To James

My very own Mycroft

ACKNOWLEDGEMENTS

This manual is not the product of a single individual, but an entire team of contributors, assisted by countless others. All our special thanks go out to:

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PART IV – ISOMETRICS: THE PROGRAMS

PART V – ISOMETRICS: BODYWEIGHT PROGRESSIONS – BY PAUL “COACH” WADE

How to Use this Manual

This manual is divided into five parts. It is essentially five books in one:

- The *first* section is devoted to the science of isometrics. It outlines the many benefits of isometric training according to the research, and clears up some common misconceptions.

- The *second* section explores and explains the design and function of the Isochain—the revolutionary digital isometric device.

- The *third* section outlines actual Isochain training drills, including a wide range of training techniques, zero-tech isometric methods, plus warm-up and cool-down systems.

- The *fourth* section transforms the drills into training sessions. It discusses the theory of isometric programming in light of the scientific studies, and suggests various training programs.

- The *fifth* section is dedicated to bodyweight-only isometrics. This section is the most exhaustive study of bodyweight isometrics available to the public, and was exclusively written by Dragon Door author Paul "Coach" Wade. It includes more than sixty progressive calisthenics holds, as well as suggestions for regressions and progressions.

Like all manuals, this book can be read from start to finish. Doing so will give you an extremely comprehensive knowledge of isometric training, as well as Isochain and bodyweight isometric techniques.

Those of you who are less interested in *theory* and are more interested in the *practice* of Isochain training can skip part 1 and should read parts 2, 3 and 4.

Athletes looking for a "quick start" to Isochain training should familiarize themselves with the device (chapters 9 and 10), the drills (particularly chapters 11, 12 and 14), and then select a training program from chapter 16 (if in doubt, head for *The Promethean* on page 296).

FOREWORD
By Dan John

I always joke that the discus throw is my mistress. We have had a long relationship and she is my temptress, my muse and my passion. At times, she is warm and sometimes she is cruel.

Most people don't know that I have another love affair: Isometric training. When I first discovered weightlifting (in 1965...and that's no typo!), the isometric training rage was still burning brightly. I grew up in a home with the Bullworker and the Exer-genie; my brothers burned holes in these devices with overuse.

Later, Dave Turner fixed my clean recovery issues (in the Clean and Jerk) with Dead Stop Front Squats (at a precise 34 inches). I taught throwers the key positions in the throws with isometric holds followed by a vigorous shake out and then the full technique. Isometrics ALWAYS worked for me as a coach and athlete.

And, I always wondered: why doesn't the whole world love them? I mean, it's simple: we train the nervous system, we attack the muscles at literally 100% effort and...well, the magic happens.

As often happens, there was a lot I didn't know. Until I found out!

Paul Wade takes us on a journey of isometric enlightenment here in "The Ultimate Isometrics Manual." We receive a graduate level course in much of the history of strength training...far beyond just isometrics. We meet many of my heroes, including Bill March who sent me the original photos from some of the articles discussed in Coach Wade's book. We go on the journey of why isometrics were so exciting to the world of strength and conditioning.

So...gentle reader...why did isometrics "die?" For the record, many great ones still use it and it continues to intrigue the smart professionals. I had no idea how simple the problem turned out to be:

- Measurability
- Loading Reflex
- Convenience

What isometrics needed "to work" for everybody was ALL three! I have a world class gym in my garage and a wife, Tiffini (whose middle name is NOT "Long Suffering" no matter how many times people say it!), who puts up with all kinds of weird things (and people) filling her home and yard.

Simply, I could overcome most issues and make isometrics work. For me.

Coach Wade's book will let you in on how YOU can use this underappreciated tool kit. Isometrics, done correctly, can do amazing things for your health, fitness and performance. After reading Coach Wade's book, I discovered that it can help with longevity, too. Isometrics make the whole cardiovascular system step up and, no, I didn't know that before I read this book.

I had a chance, years ago, to interview Dick "Smitty" Smith, one of the pioneers of isometric training. He drove Bill March to train with isometrics in a three-hour round trip three times a week when the "modern" methods were being developed (this is the bulk of Wade's Part III: *The Drills*). Smitty was honest and candid to a fault.

He told me honestly that NOTHING has ever worked as well as isometric training. But he added those dreadful two words: "Done correctly."

This is the beauty of this book: you will learn the skills and drills to enjoy isometric training "done correctly."

You have in front of you an encyclopedia of knowledge. There is a lot on warming up and cooling down. You will get calisthenic drills, bodyweight

challenges and a host of fun levers, hangs and holds. The directions are clear; the progressions are logical.

Rediscover the value of isometrics. Improve your strength, fitness and body composition with the “secrets” you find in this book. Listen to Coach Wade and enjoy the benefits of isometric work.

Done correctly!

Dan John

PART I

ISOMETRICS:
THE SCIENCE

An appreciation of its value and breadth of application should restore isometrics to a place of importance in all training programs.

-Verkhoshansky, *Supertraining*[1]

1. Introduction
Isometrics – A Scientific History

In modern fitness and conditioning culture, great strength is indelibly associated with *motion*. Training drills—where you hoist up bars, dumbbells or machine levers—are inevitably called *movements*. Bodybuilding and weight-training are even grouped under the honorific title of *lifting*. (*Bro, do you even lift?*) To become bigger or stronger, you must move. The idea that you can become hugely bigger and stronger *without moving* is clearly absurd. It's obvious—movement and strength are practically synonymous.

...Or are they?

In fact, the science says otherwise. Most athletes and coaches (even some sports scientists!) don't realize it, but science has understood for almost a century that *movement is not required* to build superior strength and muscle—and it's all thanks to machine guns and frogs.

Amphibians, warfare and bodybuilding

The early twentieth century saw the most devastating conflict in all of human history—the First World War. From 1914 to 1918 industrial technology collided with outdated Napoleonic tactics and the results were terrifying, and felt on a global scale: by the time the dust had settled, seventeen million people had been killed, and over twenty million wounded. The nature of the new weaponry (machine guns, mortars, poison gas) meant

that there were more injured soldiers than any time in history—and many of these injuries were severe, requiring many months of convalescence.

While politicians and generals wrung their hands over what had gone so badly wrong, the medical world was posed with a different problem—how best to deal with the wounded. There was a tactical element to this, of course; the longer injured soldiers remained in bed—often immobilized partly or entirely due to injury—the more they began to atrophy: waste away. Due to the nature of their injuries, many servicemen required long stints of bedrest to heal. However, over this extended period, their conditioning vanished, muscles shrank, strength diminished and even their bone density began to significantly decrease, to levels normally expected in little old ladies. In short, they became useless as soldiers.

Not good.

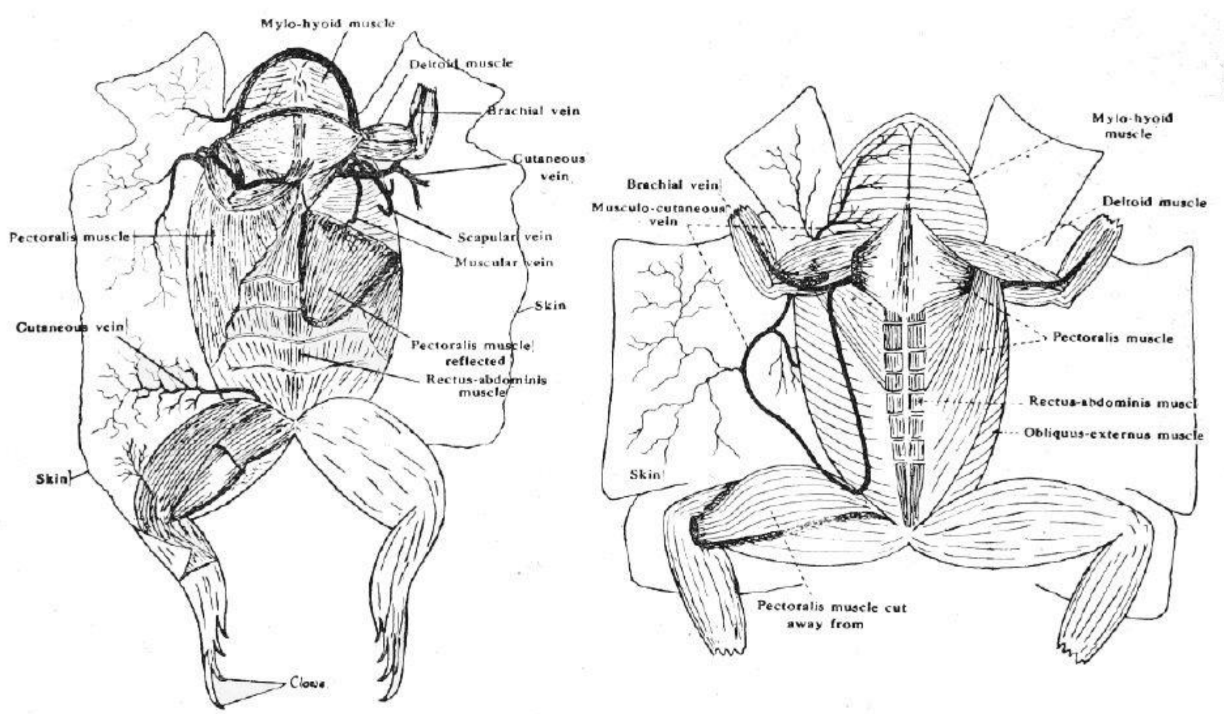
Particularly "not good" if the fragile web of armistices following the Great War were to collapse—as many imagined it would—and the Allied Powers required as many able-bodied men as possible to rush to the front to defend freedom and civilization.

In an attempt to solve this problem of atrophy, many medical institutions received government funding. One of these institutions was the Springfield College in Massachusetts. To analyze rates of atrophy in immobilized soldiers, they embarked upon a study using an amphibious population: not scuba divers, but *frogs.* It was an experiment which turned out to be hugely fascinating—for all the wrong reasons.

In the trial, the researchers took a number of frogs and securely bound just one of each of their legs to a small strut—effectively making a sturdy splint, preventing the frogs from even slightly moving the bound leg. They then popped the frogs back in their tank, allowing them to limp around as normally as possible. (I said it was *fascinating*—I didn't say it was *ethical.*)

Two weeks later, the researchers returned to their amphibious population, pencils at the ready, eager to chart just how much their immobilized legs had wasted away.

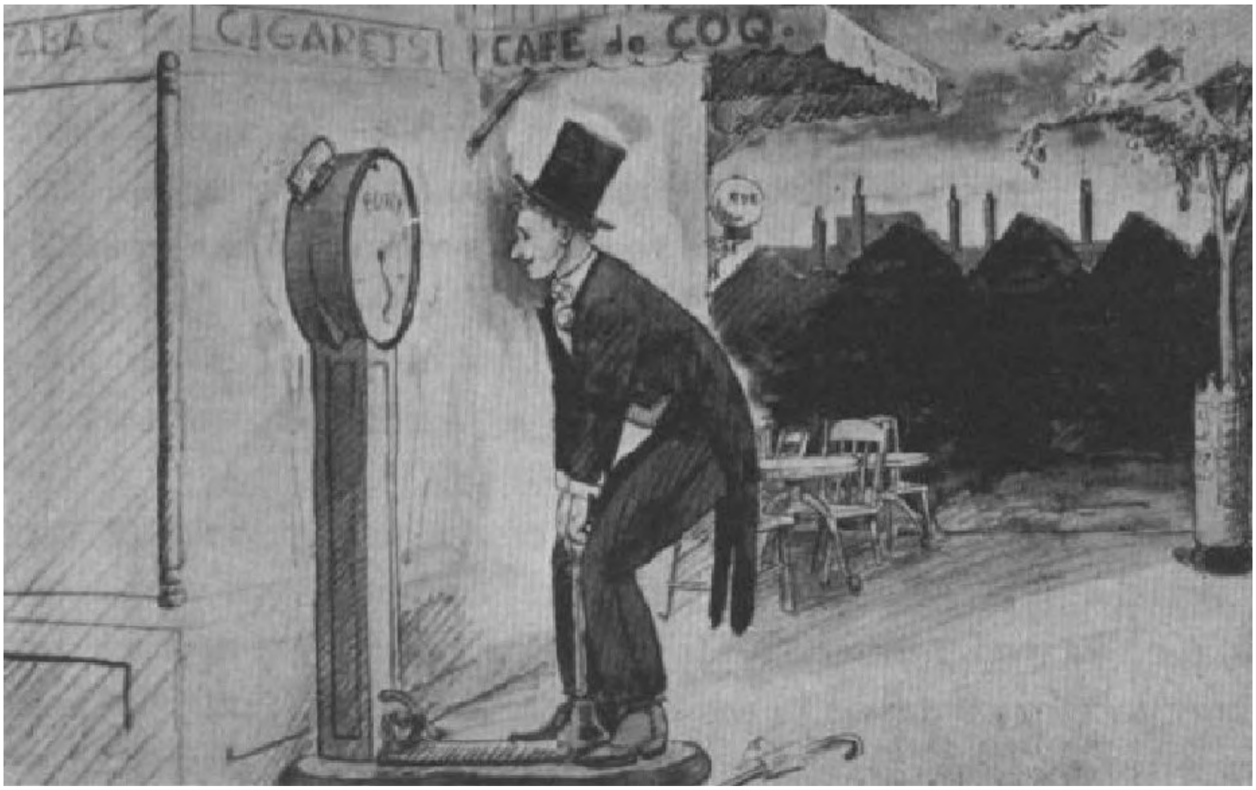
As expected, the free, unbound limb appeared perfectly normal, having been used by the frogs for daily movement. However, when the researchers removed the splints, they found something completely bizarre and counter-intuitive—the bound legs of the frogs hadn't withered away, or atrophied at all. In fact, the very opposite had occurred—the bound limb had become far larger than the free limb, almost to the point of appearing muscle-bound. Seeing this, the scientists were forced to look at each other and scratch their heads. *Why*?



Not only were the bound legs larger, they were also vastly *stronger* than they had been. When the frogs were set down, they were immediately able to jump long distances, *but in a diagonal fashion.* The bound leg was so much more powerful than the free leg, that the amphibians had to relearn how to jump in a straight line.

Before too long, the developers of the experiment realized what had actually occurred. For two entire weeks, the frogs had been pushing their bound legs against the splints, in a vain attempt to move them. They hadn't—the splints remained—but as a result, the immobile leg had gained a remarkable amount of strength and muscle.[2]

Realizing the error they had made in using an animal population, the Springfield boffins chalked the experiment up to experience and moved on to other methods. Ironically, they automatically assumed that the trial had been a *failure,* when in fact they had stumbled upon an essential truth of exercise science. They had, unwittingly, discovered the enormous power of isometric exercise.



Early isometrics testing—at the fairground

The 5 benefits of isometrics

Isometric exercise has been valued for its benefits since prehistory. Martial artists and strongmen have utilized techniques involving static holds–either of postures, or objects–for thousands of years. But the true potential of isometrics is only recently becoming understood. Fortunately, since the 1920s, the effects of isometric strength training have been studied (and repeatedly confirmed) by hundreds of controlled scientific trials.

Isometric simply means "same length" and refers to conditions of muscle contraction where the body remains static and unmoving, as contrasted with **isotonic**, or **dynamic**, exercise, where the body or limbs move. There are many related terms in modern isometrics—isokinetics, isotonic-isometrics, overcoming isometrics, yielding isometrics, etc.—but to keep things simple at this point, we'll just use the term *isometric*, and define that as *muscle contractions where the body or its limbs do not move, or move minimally.*

The more recent studies have clearly demonstrated *five* inherent advantages unique to isometric exercise: and if you are an athlete—or just interested in becoming stronger or bigger—these are benefits you *need* to know:

1. Isometric exercises stimulate strength better than dynamic (moving) exercises.
   They make you stronger, quicker than other methods.

2. Isometric exercise is at least as effective as dynamic exercise for muscle growth.
   You can get bigger using isometrics.

3. Isometric exercise is more efficient than dynamic exercise.
   Training sessions take less time.

4. Isometric exercise is less likely to incur injury, either chronic or acute, than dynamic exercise.
   Isometrics is safer, protects your joints and saves your body from wear and tear.

5. Isometric exercise can be performed more frequently than dynamic exercise.
   You can train in isometrics more often, and make more rapid progress.

This list applies to all isometrics: but if you are able to use an Isochain, there is an added sixth important benefit:

6. Isometric training on an Isochain allows athletes to perform heavy, progressive resistance training without the need for a fully-equipped gym.
   Isometrics using an Isochain is more convenient than traditional methods.

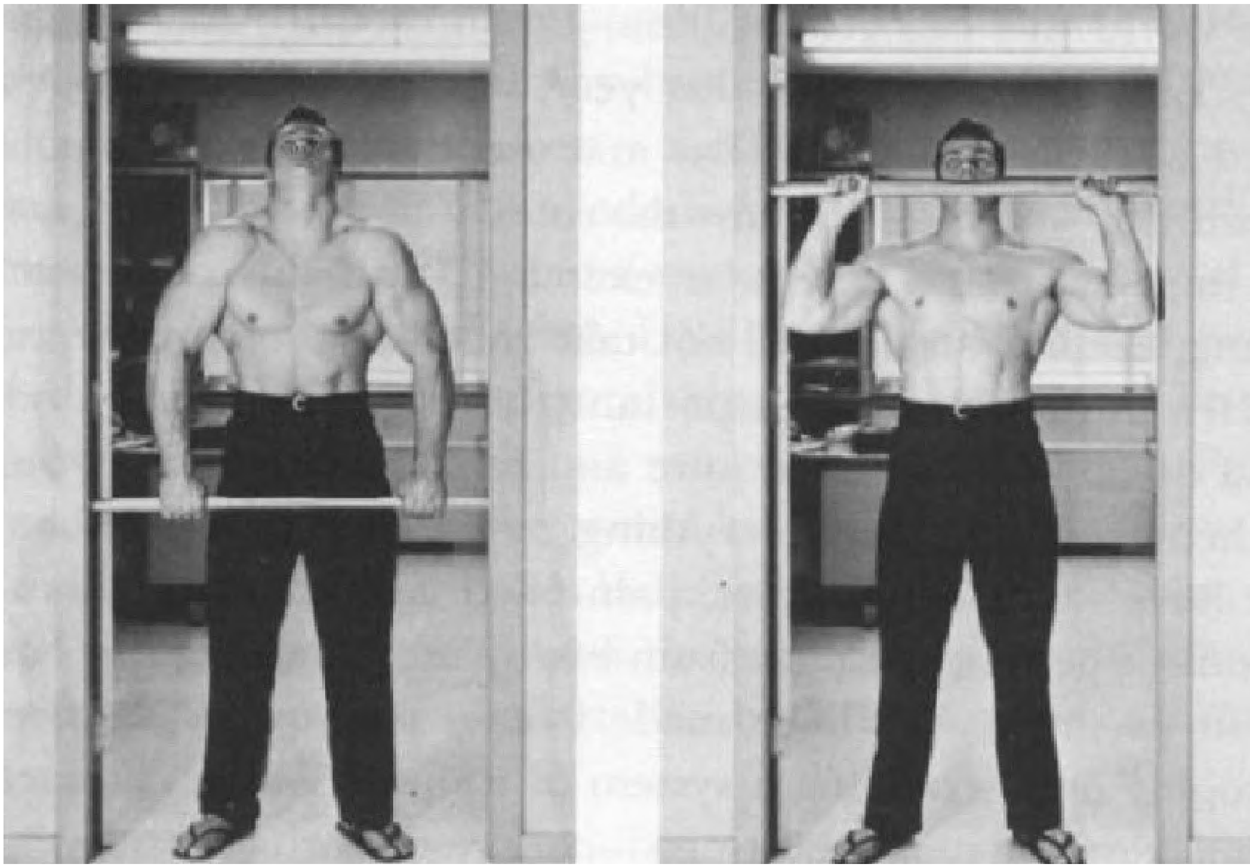
Isochains are highly durable, take up very little space, and can accurately measure training loads of many hundreds of pounds. To be able to use such loads without an Isochain would require hundreds of dollars in weight plates, or access to a conventional gymnasium. But with the Isochain, serious training—strength work or bodybuilding—can be performed at home (or anywhere) at any time.

Any athlete or coach would have to agree—that's an *incredible* rollcall of benefits.

Granted—nobody would expect anyone unfamiliar with the science to accept the first five benefits at face value, so we'll carefully examine each of these principles in turn shortly. But before we go further you might be asking—if isometrics are this great, why isn't everyone using them?

Measurement: the deal-breaker

The answer is that despite the proven efficiency of isometrics in scientific trials, there have been some major practical and methodological problems with applying isometrics in the real world. The main problem is lack of *measurement*. In most of the traditional methods of isometrics—bodyweight holds, pressing static objects (like walls or doorways) or pulling on ropes and chains—there is no possible way of measuring what you are doing; how much force you are exerting.



It's isometric, and it works—but how do you measure it?

Strength training and bodybuilding are, from a functional point of view, *the pursuit of increasing levels of force output*. Being able to measure that force output is essential for various reasons. The most basic of these is simple motivation; if an athlete is working hard to do something, he or she wants to know what they are doing, or rather, how well. Programming is another issue; many strength training programs are built around different levels of intensity—differing levels of workload. But this is impossible to do if we don't know how hard we are actually working.

Perhaps the biggest issue with a lack of measurement in isometrics relates to evaluating progress as time passes. Progressive strength training—slowly adding more and more load over time—is the Holy Grail of modern strength sports and bodybuilding. But with a chain or rope (or spring, or elastic band, or whatever) if you can't accurately measure your force output, you can't train progressively. If you can't measure progress, how do you even know if your training is working, or whether to adjust it? There are other,

minor issues, but this is the *real* reason isometrics has fallen out of favor in the modern era: lack of measurement. *It's fatal.*

Historical forms of isometrics: questions and problems

It is possible to perform measurable isometrics—some of these methods were utilized in the scientific studies we'll discuss later. But there are typically practical problems involved with these methods.

For example, one common method allows athletes to use heavy weights or, more typically, resistance machines of the kind found in most gymnasiums. Because all humans can hold (isometrically) more weight than they can lift (dynamically) this means that in order to perform isometrics, the trainee requires one or two willing partners to lift the weight into position to begin each hold. This allows you to measure the weight (e.g., number of plates in a stack) being held static by the athlete. Unfortunately, finding assistants willing to do the actual *lifting* poses a problem. In addition, isometrics makes athletes so powerful so rapidly, that conventional machines often just don't have enough weight resistance to be viable long-term.

Another method is to use super-heavy weights in a special rack—if you have ever seen "power racks" in a gymnasium, this was why they were *originally* invented. Today they are mostly used as simple safety devices during squatting or bench pressing, but few gym-goers realize that they were originally designed to allow athletes to perform heavy isometric holds without the need for training partners.

The man who popularized these racks was Bob Hoffman (1898-1985). Hoffman, an athlete and record-breaking weightlifter with more than six hundred trophies and awards to his credit, was—after Joe Weider—the most prominent advocate of weight-training and bodybuilding of the twentieth century. As well as being the US Olympic weightlifting coach, Hoffman was also an avid exercise ideologist who published the infamous periodicals *Strength and Health* and *Muscular Development*. After decades of international-level competition and coaching, Hoffman concluded that

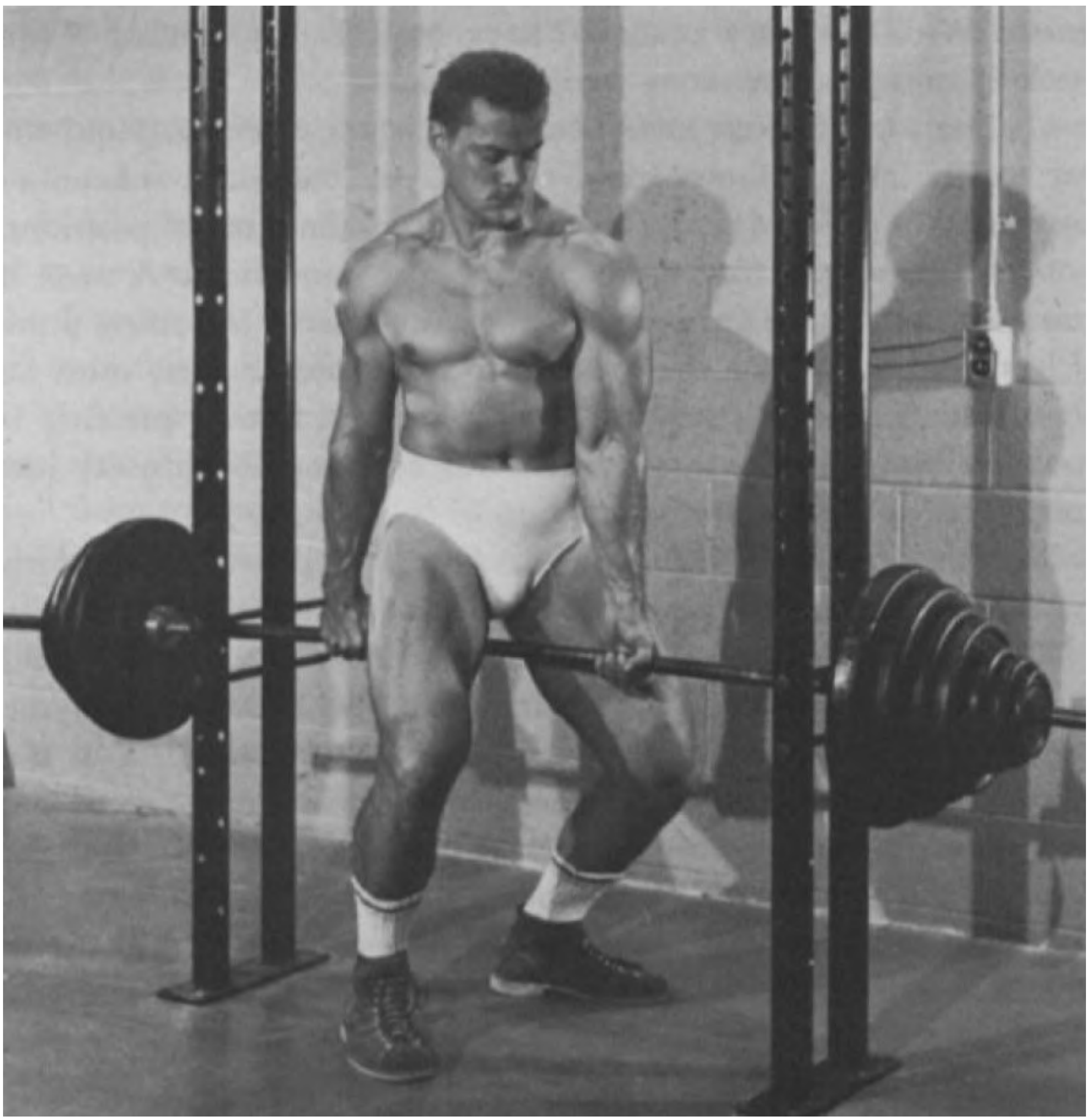
isometric training was the greatest and most productive strength training method in existence. He literally *wrote the book* on isometric training.[3]

Isometric contraction will develop functional strength more quickly and more completely than any other method known to man.

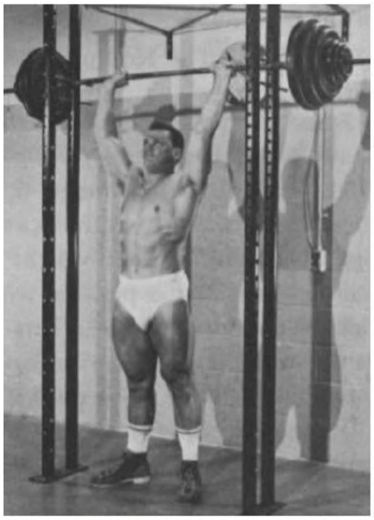
-Bob Hoffman

To say that Hoffman's method of using an isometric rack to help athletes hold super-heavy barbells *worked*, would be something of an understatement. His star pupil and guinea pig, Bill March, gained so much power using Hoffman's isometric training that he was able to win podium positions at the World Championships and summer Olympics. A record holder in the press, he was so far ahead of his contemporaries that—as a middle-heavy—he could outlift heavyweights on the international scene. Interestingly, his isometric training amplified his physique to the point where he placed second in the IWF Mr Universe competition, despite never performing any conventional "bodybuilding" exercises. Sadly, Bill March's accomplishments are too often overlooked today, because he was one (among many) of the first generation of steroid users in strength sports. However, it should be remembered that, at the time, these compounds were new, and entirely legal.

Hoffman's power rack method works; and the force output—the weight on the bar being held—is at least *partially* measurable (you can measure the weight on the bar, but not the extra force being pushed into the power rack pins). The major drawbacks are the availability of these units, as well as their expense, and the need for lots (and lots) of barbell plates. In addition, few trainees have access to an Olympic-level coach versed in isometrics, as March did.



Bill March performs isometrics in Hoffman's power rack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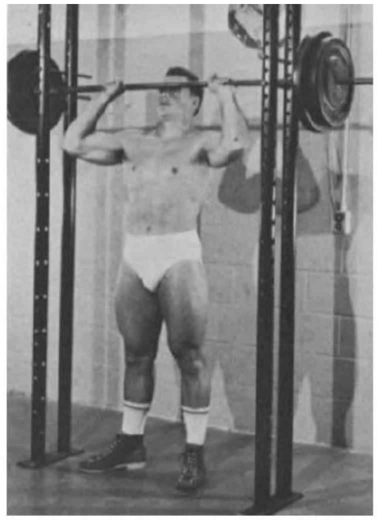
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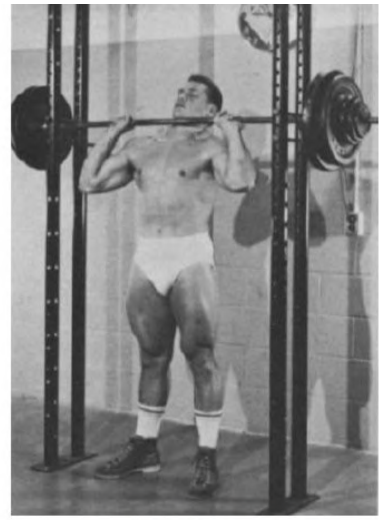
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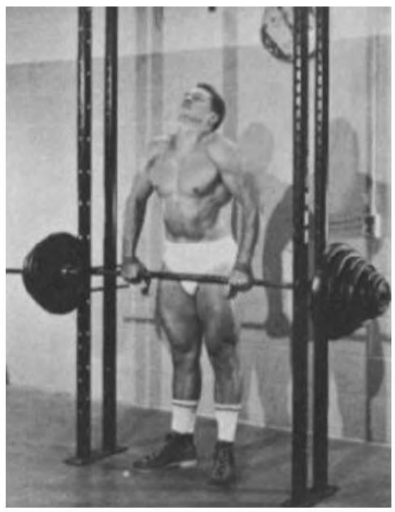
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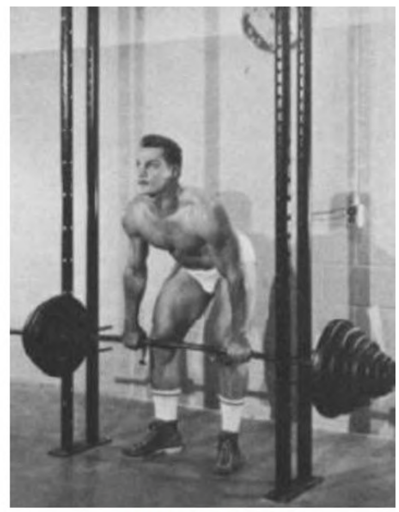
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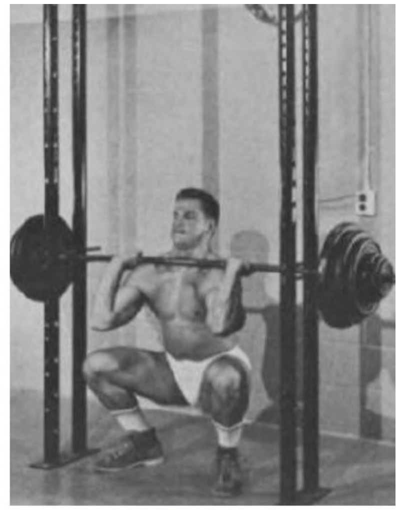
EXERCISE 7


EXERCISE 8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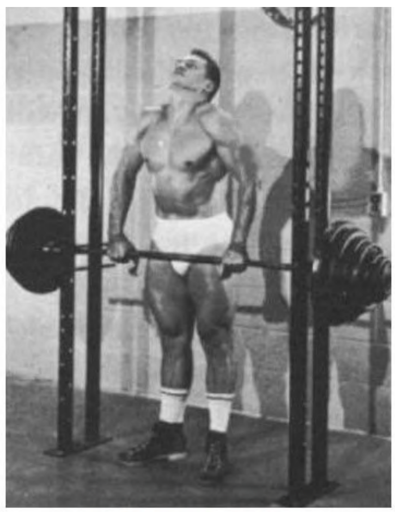
EXERCISE 10


EXERCISE 11


EXERCISE 12

HOFFMAN'S FUNCTIONAL ISOMETRIC CONTRACTION SYSTEM

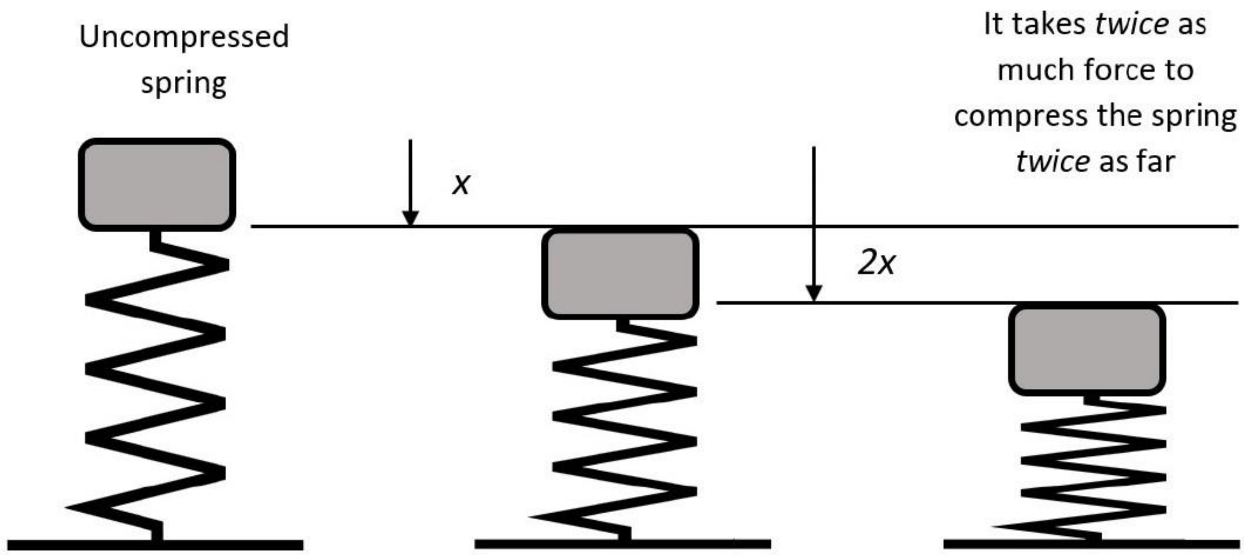
Hoffman based his drills around classical weightlifting. The twelve fundamental drills comprised three presses, three pulls, three squats, a calf raise, a shrug, and a hanging abdominal exercise (Hoffman recommended hanging work as both a warm-up and a cool-down):

1. Overhead press: top

2. Overhead press: midpoint
3. Overhead press: bottom
4. High pull
5. Middle pull
6. Low pull
7. Back squat: top
8. Back squat: midpoint
9. Back squat: bottom
10. Calf raise
11. Shrug
12. Hanging frog kick

Athletes were instructed to perform one set with maximum effort; when they could hold the weight static for 12 seconds, the weight was increased.

There are of course isometric tools like the old-fashioned *Bullworker*—essentially a spring-loaded two-part telescopic pipe with a force meter on the side, which slides up accordingly as the pipe is squeezed. Nobody would deny that Bullworkers really work—they do—but unfortunately, they don't genuinely measure progress. In theory you can measure the isometric hold of a Bullworker squeeze by seeing how far the cylinder compresses via the meter on the side, but because the resistance is generated by a *spring*, Hooke's law (and therefore the principle of *diminishing returns*) applies. This means that, beyond a certain point, the pipe is almost impossible to compress, and huge force is required to move the meter even slightly. This means that (beyond the beginner stage) progressive measurement is realistically impossible. Another problem is that Bullworkers severely limit the amount of *serious* exercises you can perform. Heavy leg and back work—the key to advanced total-body strength—is impossible on a Bullworker.



Hooke's law: with a Bullworker, the harder you push, the less movement you get. This would not be a problem with a digital gauge, but for a mechanical gauge it's a serious issue.

Of course, there are even older methods than the Bullworker. Old-time strongmen like Alexander "the Amazing Samson" Zass used to utilize a chain for isometrics; looping one end around a foot, he would pull on the other end. (Zass was so powerful, he sometimes broke the chain he was using. But then, this was a man strong enough to pick up his horse, and take it for a walk.)

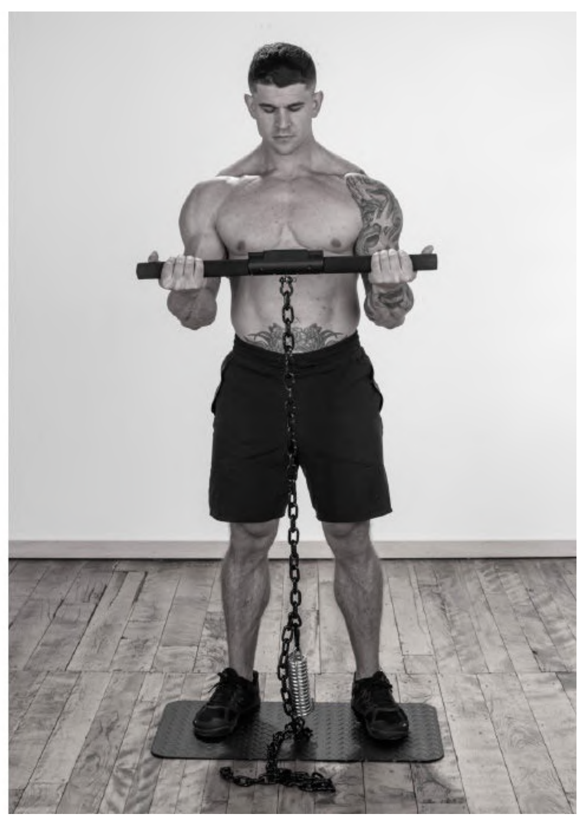
Half a century later, Bruce Lee—who used isometrics religiously—had one of his students, George Lee (unrelated) build him a superior, adjustable version of the chain device with a bar-handle and a baseplate to stand on. Virtually every serious Olympic weight-lifting gym through the 1960s and 70s had similar custom-made chain devices.

Image: Bruce Lee using chain and bar device

Comparable isometric chain tools were available commercially. They never truly took off during the bodybuilding and home-fitness explosion the way that weights and other gadgets did, however, because of the familiar old demon of *measurability*. How can you tell how hard you are pulling/pushing against a chain? You can't. And if you don't know your force output, you are just spitting in the wind when it comes to your training.

Next-gen isometrics: technology solves the problem

The answer to this problem of measurability—simplified—is to add a force gauge to the chain. This has been attempted before—it was happening as early as the sixties—however, the older gauges were mechanical. This meant that the athlete needed somebody else to look at the gauge during training, to tell them how they were doing—there was no easy feedback mechanism. Training was stilted, and training alone virtually impossible because the athlete couldn't *see* the gauge.



The Isochain makes serious isometrics viable as an elite training method. We'll look in-depth at the components and engineering of the Isochain in chapter 9.

Fortunately, there is now an ultimate solution to the problem of measurability: we make the force gauge *digital*. This is where the Isochain is revolutionary. It not only allows you to perform *all* the major standing techniques of bodybuilding and strength training; it not only *measures* how much you are "lifting"; but it also allows you to instantaneously and directly *see* that metric—in pounds or kilograms—on the LCD electronic display on the handle. In addition, the unit has an audible feedback system: an alert sound tells you when you have hit a target weight, or held that weight for the desired time.

The take-home message here is—yes, there have been problems with isometrics in the past, but technology now allows us to eliminate those problems, and unleash the power of isometrics training in a way which was impossible previously.

Now, as promised—a deeper look at the five principal benefits of isometrics.

Isometric exercise is unique in its ability to rapidly increase muscle strength and tone muscle faster than that seen for dynamic exercise.

-Petrofsky, et al.[1]

2. Isometric exercises stimulate strength better than dynamic (moving) exercises.

Isometrics make you stronger, quicker than other methods.

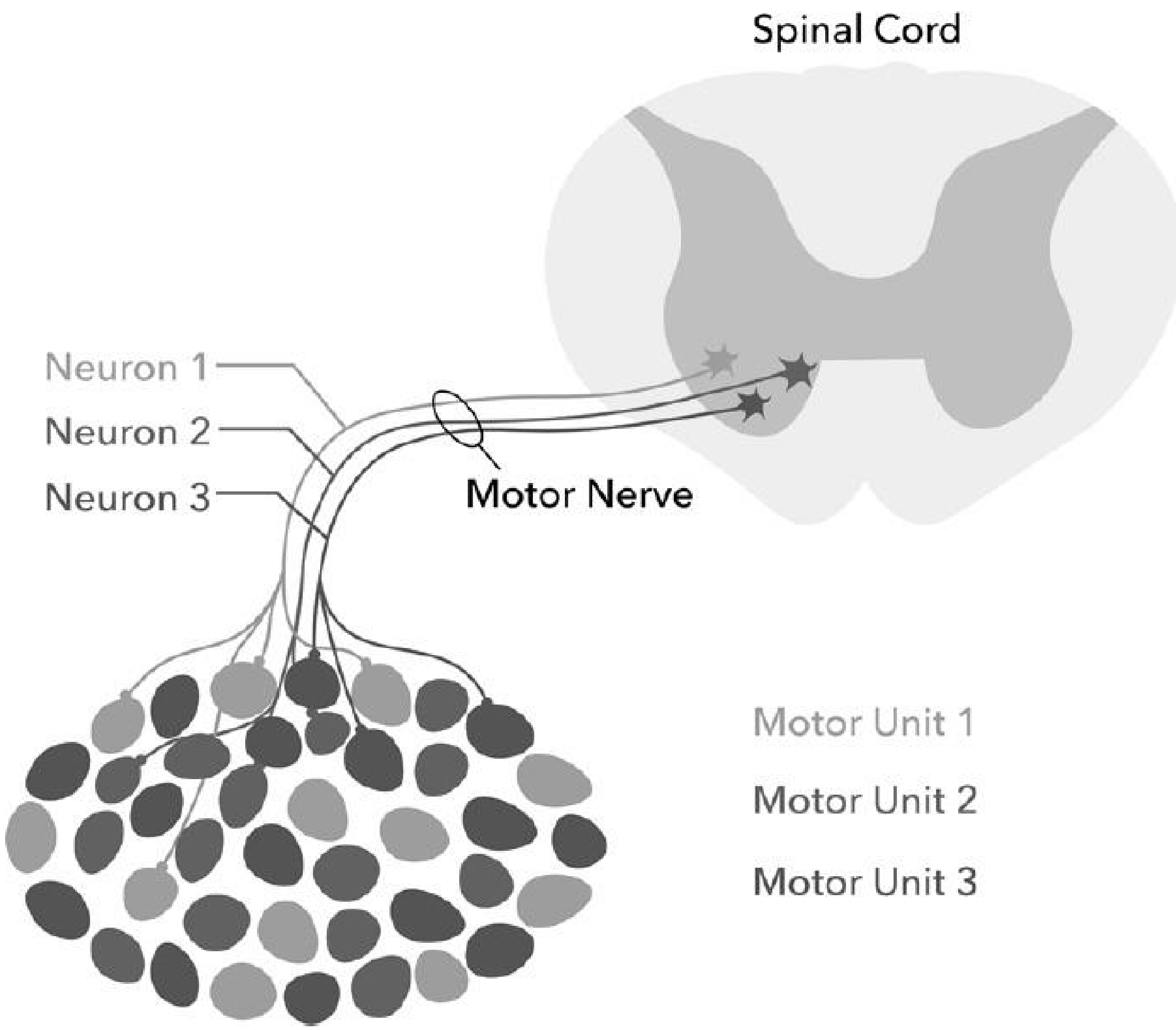
Modern athletes (and coaches) are often so wrapped up in conventional methods of training—for example, the focus on picking weights up and putting them down again—that they rarely stop to actually *understand* the ABCs of strength development. However as soon as you become cognizant with these fundamentals, you will realize why it is not so bizarre at all that isometrics works as well as it does. In fact, it becomes obvious. So, let's briefly revisit the science.

We must begin by asking, *what makes human beings stronger?*

Neurological recruitment and Hebb's rule

Several factors contribute to strength development, but the most significant of these is *neurological recruitment.* Let's say, for the sake of example, that a muscle has 100 muscle cells. Each of these is connected to the nervous system by a neuromuscular junction, a mini neurological "switch" which turns that cell on or off. This is our strength "hardware". Individual muscle cells have no "dial" on them—just a binary on-and-off switch. They either fire completely, or not at all. (Biologists call this the *all-*

or-none law.) As a result, how much force a muscle can develop depends on *how many* of the muscle cells get switched on. How effectively our nervous system can turn on those muscle cells represents our strength "software".



The force a muscle can generate depends largely on neurological recruitment.[2]

Most untrained individuals have terribly inefficient software. They have the same *number* of muscle cells as strength athletes, but their nervous systems are not as good at recruiting those cells. So, whereas a strongman or a kung fu master might be able to recruit 80% of his cells, the untrained Joe will only be able to manage, perhaps 30%. (This answers the age-old question as to why some individuals can be small, but far more powerful than much

larger men. The small man can have next-gen software, while the larger guy is still working with Windows 2.0.)

Fortunately, anyone can improve the efficiency of their neurological recruitment. You can upgrade your strength software. This can be achieved by forcing as many of your muscle cells to fire as possible—maximal recruitment—and doing this repeatedly. Doing so causes the neural pathways which make the muscle cells switch on to become more efficient communicators, according to a neurological principle known as *Hebb's rule* (later paraphrased by the neuroscientist Siegrid Löwel as: *cells which fire together, wire together*).

In layman's terms: repeated maximal muscle contractions are what make us stronger—and the *more force your muscles repeatedly generate,* the stronger you'll get. No surprises so far.

But the next question is: *how do we make our muscles generate maximum force?*

Science has an answer to that one, too.

Muscle force and speed: Hill's Equation

As far back as 1938 a brilliant English physiologist (and Nobel Prize winner) named Archibald Hill developed an equation which perfectly matched all the empirical data which had ever been gathered on muscle force and contraction:

$$(F + a)(V + b) = c$$

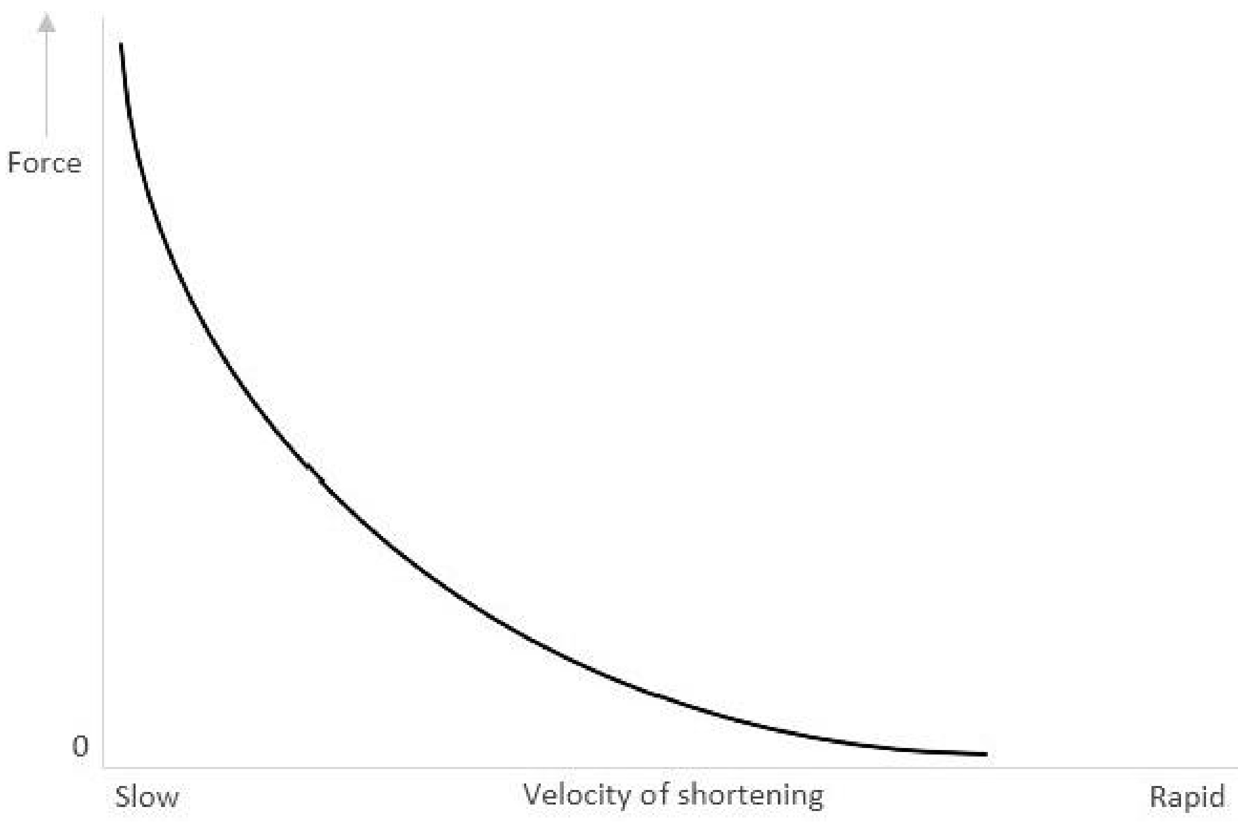
Where F is muscular force, V is muscular contraction speed (velocity), and *a, b,* and *c* are constants.

This equation—actually closely related to thermodynamics—later became summarized as the *force-velocity relationship.*

Thankfully for non-mathematicians, this relationship is typically expressed in terms much easier to understand than Hill's law. As it relates to concentric contractions (where the muscles shorten, as in lifting something up) this relationship can be put very simply:

Where muscle force is high, contraction velocity must be low.

In other words, the more force a muscle expresses, the slower it has to move. This is a tried and tested scientific law, but with a little thought, anyone can see that it's true. Imagine moving an object very fast—like throwing a dart. To achieve high velocity, the force would have to be very low (the small, light dart). Now imagine trying to shift an iron anvil. You would only be able to lift the anvil off the ground very slowly, due to its weight. The more *force* your muscles produce, the *slower* they move.



The force-velocity relationship

Hill's equation and the force-velocity relationship take this to its natural conclusion. If you look at the above graph, you'll see that when moving an

object, the more force a muscle produces, the slower it moves. This cannot continue indefinitely; and when maximal force is reached, the movement stops altogether. To put this in another way: *static muscles are capable of producing more force than moving muscles.* Concentric motions—where you lift barbells, dumbbells, and other objects up, moving them through space—can never produce as much force as isometric holds. There is just no way around this. The more force your muscles produce, the slower they can move any object. It's physics.

> Muscle is capable of producing its maximum force when it is contracted isometrically…Once the contraction becomes isotonic (concentric) the amount of force decreases.
>
> -*The Anatomical and Mechanical Bases of Human Motion*[3]

The take-home message of this is revolutionary for the average strength athlete. The conventional methods of resistance training—lifting up barbells and dumbbells—are *not* the most efficient means to produce muscular force. Because of the force-velocity relationship, the more force a muscle exerts, the slower it can lift an object: and it can produce more force isometrically—by contracting hard but not moving—than it possibly can by lifting weights up.

WHAT ABOUT "NEGATIVES"?

As well as *concentric* training, strength athletes and bodybuilders sometimes apply *eccentric* training—lowering weights under resistance. It was discovered as early as 1882 that eccentric movements generate larger forces within the muscles than either isometric or concentric contractions.[4] This makes intuitive sense; you can set down a weight much heavier than you can lift up, or even hold steady. Most studies, however, indicate that isometric training is slightly superior to eccentric work training in producing strength results.[5,6] This may be due to neurological reasons; more muscle cells

are activated during isometric training than either concentric or eccentric training.[7]

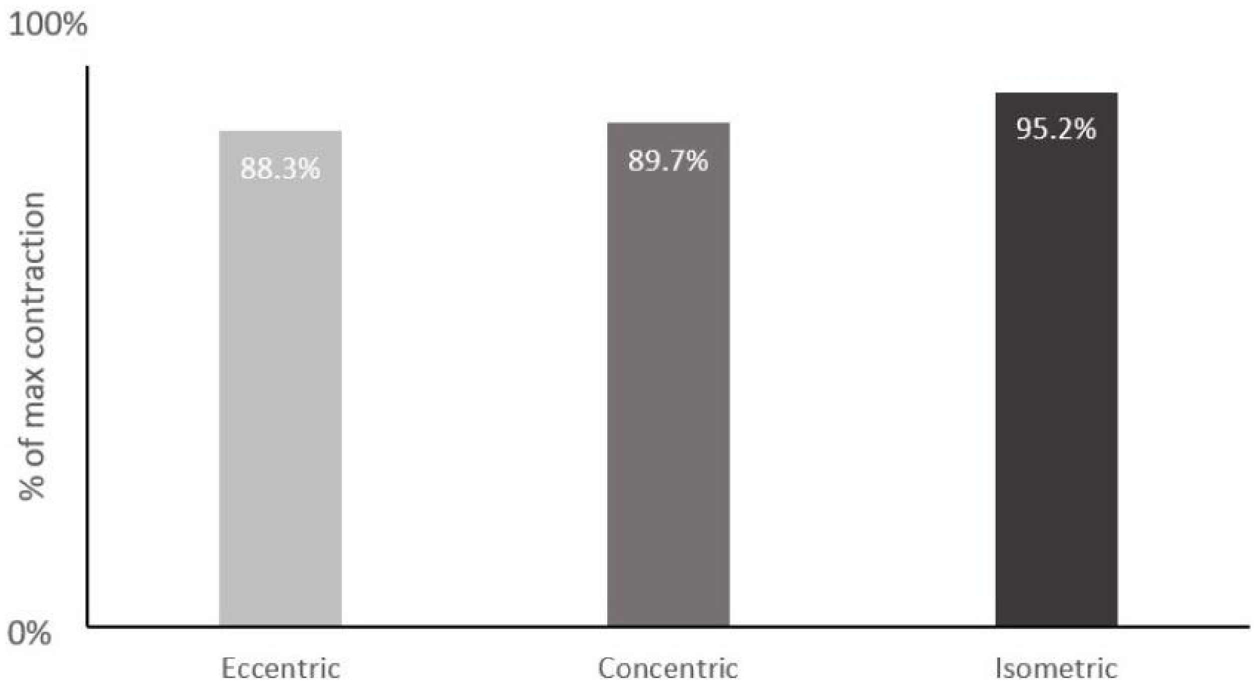
Early German isometric testing (Hettinger, 1961)

Are isometrics really "better" than regular weight-training for strength? Remember that all athletic training follows the Specificity Principle:[8] you get better at what you practice frequently. This is why, in studies where dynamic strength is used as a testing criterion, dynamic strength is more

***result-producing; where isometrics is tested, isometrics is the victor*.**[9] ***Therefore, if your goal is just to lift weights up and down, the best way to achieve that is through regular weight-training. However absolute strength can only be measured by the maximum forces generated by the muscles, and (according to Hill's law) these must be isometric—this is why scientific studies generally use isometric criteria for strength testing*.**[10] ***If absolute strength is your goal, isometric training is unquestionably superi or. If you want to gain the strength benefits of isometrics while retaining weightlifting "skills", US Olympic weightlifting coach Bob Hoffman recommended training 4-6 days a week with isometrics, with one day reserved for regular, dynamic weight-training*.**[11]

It might be said that Hill's law and the force-velocity relationship are just "theory": and that during actual lifting, isometrics cannot produce levels of tension or contraction superior to those achieved by moving live weights. In fact, a large body of research supports the fact that maximal isometric holds are superior to dynamic training (or any other known method) in terms of muscle fiber recruitment.[12, 13, 14, 15, 16]

Incredibly, isometric training is capable of recruiting *nearly 100%* of a muscle's motor units. In 2001, the Sports Science and Technology Unit (STAPS) of the University of Burgundy organized a series of research trials to discover which mode of contraction—concentric, eccentric, or isometric—recruited the most motor units. The testing was conducted using cutting-edge electromyography, and the results were conclusive: maximal eccentric muscle contractions reached 88.3%; concentric contractions topped out at 89.7%; the isometric contractions were far more powerful, reaching an astonishing 95.2%.[17]



Both concentric and eccentric contractions with limit loads reached a large percentage of muscle fibers; but isometric contractions are proven superior.

We know that the final muscle fibers to be activated—the hardest fibers to reach during training—are the larger, Type II fibers: the ones which adapt to produce gains in strength and size.* It follows then, that the resistance training method with the greatest power to recruit the largest proportion of muscle fibers will be the superior one. Isometrics is that method. In terms of recruiting motor units, it is peerless.

Unfortunately, very little of this data bled through to the general fitness-oriented public; at least, in the West. In the Soviet Union, it was a different matter—isometrics were taken seriously and used widely by Olympic athletes—with not insignificant benefits.[18]

Isometric training is a superior form of resistance training. Biology substantiates it, physics explains it, and multiple studies prove it. Yes—previously, there have been methodological problems with isometric training: in particular the difficulty in recording the forces involved. With the advent of the Isochain, however, these problems are a thing of the past. There is no reason not to fully embrace isometrics as a superior scientific strength training tool for the 21st Century.

*Due to the neurological phenomenon known as Henneman's size principle: see page 37f.

It is clear that isometric training can result in significant hypertrophy.

-Fleck, et al.[1]

3. Isometric exercise is at least as effective as dynamic exercise for muscle growth.
You can get bigger using isometrics.

In athletics training, many myths seem to hang around through the years—despite being repeatedly disproven. A good example of such a myth is the idea of *spot reduction*; the notion that, simply by working the abdominals, belly fat will melt away, leaving the abs more visible. In fact, this theory was demonstrated to be a fallacy decades ago; the body loses fat proportionately, no matter how you train.[2] Yet we still see this concept touted in training courses and exploited in infomercials. Another myth which is still in wide circulation despite being completely rejected by science is the idea that isometric training does not trigger hypertrophy—that it doesn't produce significant muscle growth. Nothing could be further from the truth, as we shall see.

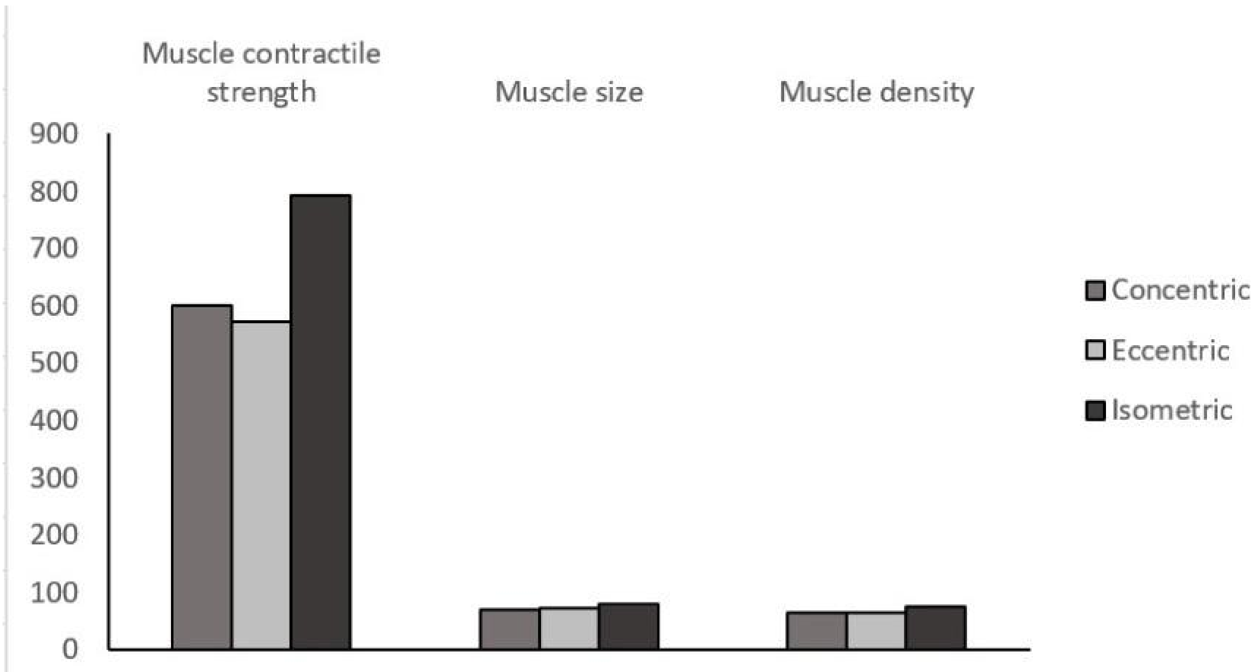
Early studies of isometrics vs other methods of training tended to be based around *function*. They mainly examined strength increases and endurance. However, the bodybuilding boom could not be ignored forever, and in the mid-eighties researchers at the Department of Medicine of the University College London sought to finally discover the truth regarding the effects of isometric work versus dynamic work in relation to *hypertrophy*. In other words: can isometrics make you *bigger* as well as stronger?

Amazing as it seems, nobody had really answered this question before. Yes, the Springfield Frog Experiment proved that isometrics increased muscle size in *frogs*, who—thanks to unilateral isometrics—wound up looking like lopsided aquatic Schwarzeneggers. But that was frogs. What about humans?

Over the course of twelve weeks, a sample population was split into two. One group performed dynamic thigh exercises on a leg-extension machine. The researchers had this group exclusively lift weights *upwards* (concentric movement) with one leg, and try to resist much heavier loads pushing *downwards* (eccentric movement) with the other leg. The second group performed the same thigh exercise, but isometrically—they *statically* fought against the leg extensions with one leg. (The unworked leg of the isometric party functioned as a control group.) Throughout the trial, measurements were taken with the most accurate instruments available to science (electromyographs, anthropometers and computerized topography).

The results were highly interesting, to say the least. The strength of the isometrically-trained quadriceps was almost off the chart—more than *doubling* the eccentric strength increase, and tripling the concentric gain. There was no surprise there. But there *were* surprises in the hypertrophy—muscle gain—results.

All three methods of resistance training caused some muscle growth; though nothing equal to strength gain.* The highest muscle gain came from the concentric training, where the muscles increased by an average of 3.8 cm^2. Isometrics was hot on the heels of eccentrics, with a 3.7 cm^2 increase; and eccentric lifting came in dead last, with a 2.4 cm^2 size increase. The isometrically-trained muscles also gained more *density* (think "muscle tone") than the muscles trained by eccentric or concentric movements.[3]



Study hypertrophy results chart

To summarize: *isometric training actually causes more muscle gain than training with weights you can lift up repetitively.* Not by a huge amount, mind you—but by a significant amount. Metastudies[4] have confirmed the fact: if you want to gain muscle, you can do so with isometric training.

So: if the science is already out there, why isn't everyone doing isometrics, in gyms all over the world?

Sacred cows and Semmelweis

The major difficulty in establishing a radical or novel practice lies not in its efficiency or validity. The major difficulty is *psychological*. Where sacred cows are established in any field of endeavor, they are incredibly hard to overcome—no matter how useful or powerful alternative theories may be.

In psychology this almost universal effect—the natural instinct to reject new ideas in favor of the status quo—is called the *Semmelweis reflex*. The Semmelweis reflex is named after a famous medical pioneer, Ignaz Semmelweis. Through rigorous experimentation, Semmelweis proved that childbed fever—a major cause of mortality in the 19th century—could be virtually eliminated if doctors simply washed their hands in an antiseptic

solution. Despite this, the entire medical community (of scientists, remember!) automatically rejected Semmelweis's advice out of hand—simply because, throughout recorded history, doctors had never deigned to wash their hands. It didn't help that Semmelweis was ahead of his time: Pasteur wouldn't develop germ theory for several years, so nobody understood fully why his method worked. Eventually Semmelweis's ideas were gradually accepted, saving literally millions of lives, worldwide. But in his own time, Semmelweis was shunned by his colleagues and ultimately sent to an insane asylum, where he died from a beating by the guards—all because humans find it difficult to accept new ways of doing things, even if they work.

Modern bodybuilders are not *exempt* from the Semmelweis reflex; in fact, they *exemplify* it. The idea of picking up objects and putting them down for multiple sets and reps is so deeply engrained in the psyche of the entire strength and conditioning world that its hold is virtually impossible to break for many people.

This is a mistake. All athletes must be encouraged to base their training on *logic* and *science*, rather than primitive *groupthink*. There is nothing magical about lifting objects like barbells up and down, and up and down. As discussed in the previous chapter, the most basic biological science teaches us that muscle cells are binary. Like basic lightbulbs, they either switch on, or off. They either contract, or they don't. They do not know what the rest of your body is doing while they are doing this; they don't care whether your arms are moving up and down, or remaining in one position. All they know is on/off. So why should it matter whether you are lifting objects up or down, or keeping objects stationary, as in an isometric hold?

Muscular growth: hypertrophy, load, fatigue

Over a century ago, biologists believed that muscles grew larger via *hyperplasia*—cell splitting. It was believed that novel forms of resistance caused new muscles cells to split away and develop, much in the way embryos grow from initial gametes (sex cells). We now understand that this does not occur. Although hyperplasia is a real phenomenon in muscles, it

accounts for less than 5% of any new growth, and can largely be discounted as a mechanism.

We now know—and we have known for some time—that muscle growth is due to *hypertrophy*: cellular enlargement. Rather than splitting to make new cells, muscles respond to resistance by increasing the size of the individual cells. The biology of muscular hypertrophy is imperfectly understood. It is currently believed that microtrauma, metabolic stress, and mechanical tension all play major roles.[5]

One of the reasons why static exercise is effective for improving dynamic performance is that both static and dynamic training produce similar hypertrophic effects.

-Morrissey, et al: Medicine and Science in Sports and Exercise[6]

Whatever the biology, what we *can* do with relative certainty is develop models which explain how muscular growth is triggered, according to empirical evidence. Recent studies seem to agree on one fundamental point: in terms of training, the key factor is not the amount of *force* exerted by the muscles, *per se*: it's the depth of *fatigue* caused by that force:

Heavier loading (usually expressed as percentage of a person's maximal strength or single repetition maximum – 1RM) is often recommended as the optimal way to maximize muscle hypertrophy with resistance training. However, there is very little empirical evidence to support this supposition and it is unclear as to the physiological mechanisms by which heavier training loads would provide a signal for greater muscle hypertrophy as compared to, for example, a lighter load lifted to the point of fatigue; both conditions would result in a large amount of muscle fibers being recruited. As proof-of-principle, we recently tested this idea and demonstrated that a single bout of resistance exercise performed at 30% of1RM to the point of momentary muscle fatigue (failure), was equally as effective in stimulating myofibrillar protein synthesis rates (MPS) as loads lifted at 90% of 1RM (also lifted to fatigue).

-Mitchell, et al. 2012[7]

The scientific verdict: *high loads build strength. High volume builds endurance. Muscular fatigue generates growth.* Of course, there is some overlap, but the principle stands nevertheless. The seminal study quoted above was published in the *Journal of Applied Physiology,* where subjects were instructed to train to deep fatigue—"muscle failure"—using either 90% or 30% of their maximum training load. Using MRI scans and advanced histochemical testing, it was discovered that both training sessions produced similar levels of growth—*as long as the training was taken to failure.* The conclusion? Muscle fatigue triggers hypertrophy; not load or volume.[8]

Often science and in-gym experience (a.k.a. "broscience") find themselves at loggerheads, but in this case they seem to mesh perfectly. This principle explains why, traditionally, strength athletes use very low repetitions with heavy weights, and long breaks between sets—it allows them to exploit high levels of force without becoming exhausted. (If pure strength is what you want, exhaustion would simply hamper training volume and frequency, with no added benefit.) On the other hand, bodybuilders tend to focus on somewhat higher repetitions with (relatively) lighter weights, plus intensity techniques such as *drop sets, forced reps, pre-exhaustion sets* and *rest-pause reps*—these methods allowing them to deeply fatigue their muscles to a level heavier loads do not permit. They are rarely found in strength-training regimens, however.

Anecdotally of course, this makes sense to anybody who has spent some time in the training world. It has long been realized that some athletes can train by lifting *huge* loads and remain relatively small—Olympic lifters are the prime example—while others can get away with lifting *lighter* loads and grow much larger muscles—here, bodybuilders are the prime example. The key to developing strength is repeated high *muscular force*; the key to hypertrophy is *muscular fatigue.*

This is not to say that bodybuilders can't be strong. Many bodybuilders, plainly, are *hugely* strong—if not in the elite league of powerlifters or weightlifters. It is also not meant to imply that strength has *nothing* to do with bodybuilding: it does, precisely because in order to progressively fatigue their muscles over time, bodybuilders are *forced* to use incrementally heavier loads to prevent habituation. It just means that bodybuilders don't develop

strength for its own sake—they learn to use strength, and the heavy loads it permits, as a tool to fatigue their muscles more and more deeply.

Isometrics and muscular fatigue = growth

This leads us neatly to the key question: *if muscular fatigue is what causes growth, can isometric holds generate fatigue as well as dynamic repetitions?*

Simple math and physics can answer this question for us. Muscular fatigue is directly proportionate to the sum of muscular contraction. How do we measure muscular contraction? *Muscular force multiplied by time*.

Muscular fatigue is directly proportionate to muscular force x time.

In other words, fatigue can be defined by the amount of *force* your muscles can generate in a given period of time. More force in the same length of *time* results in more *fatigue*. This is sometimes known in hypertrophy science as TUT, or *Time-Under-Tension*. Research indicates that greater TUT leads to greater muscle fiber recruitment and muscle growth.[9]

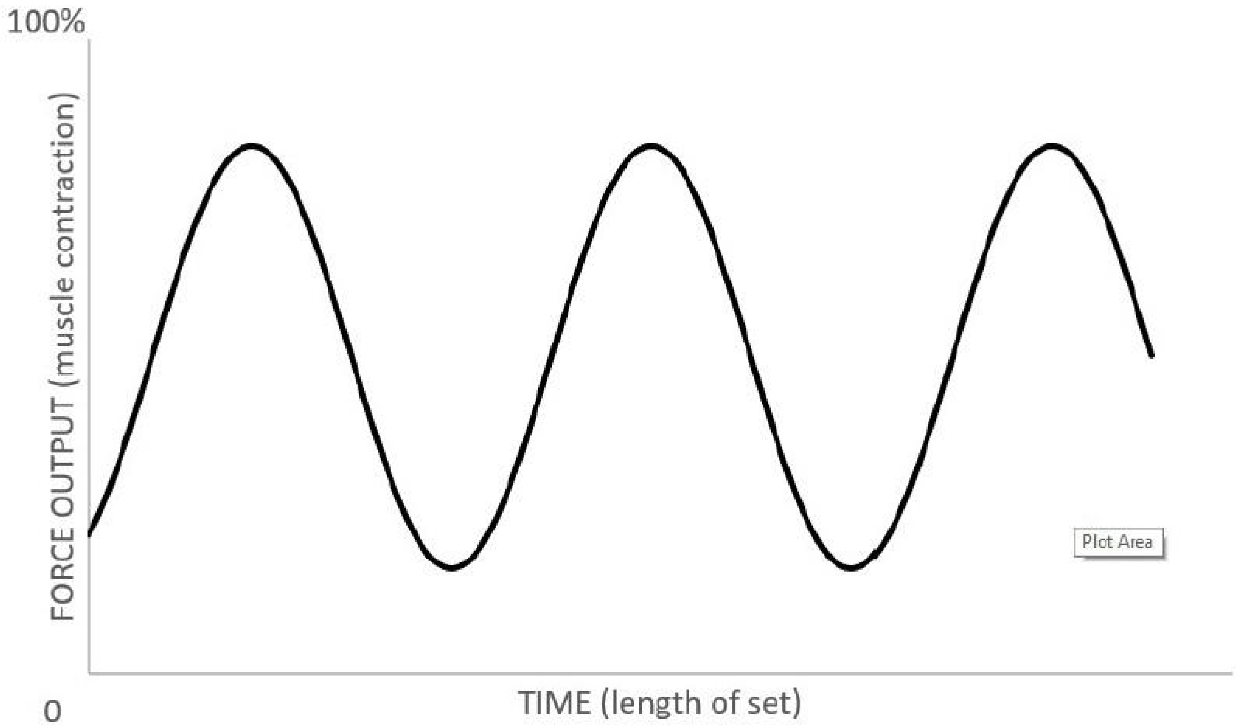
We have already established that isometrics can result in more muscular force than dynamic reps—this is a consequence of the *force-velocity relationship* (page 21). But what about the time factor? Can you generate more force over time by lifting a load up and down or by holding it statically?

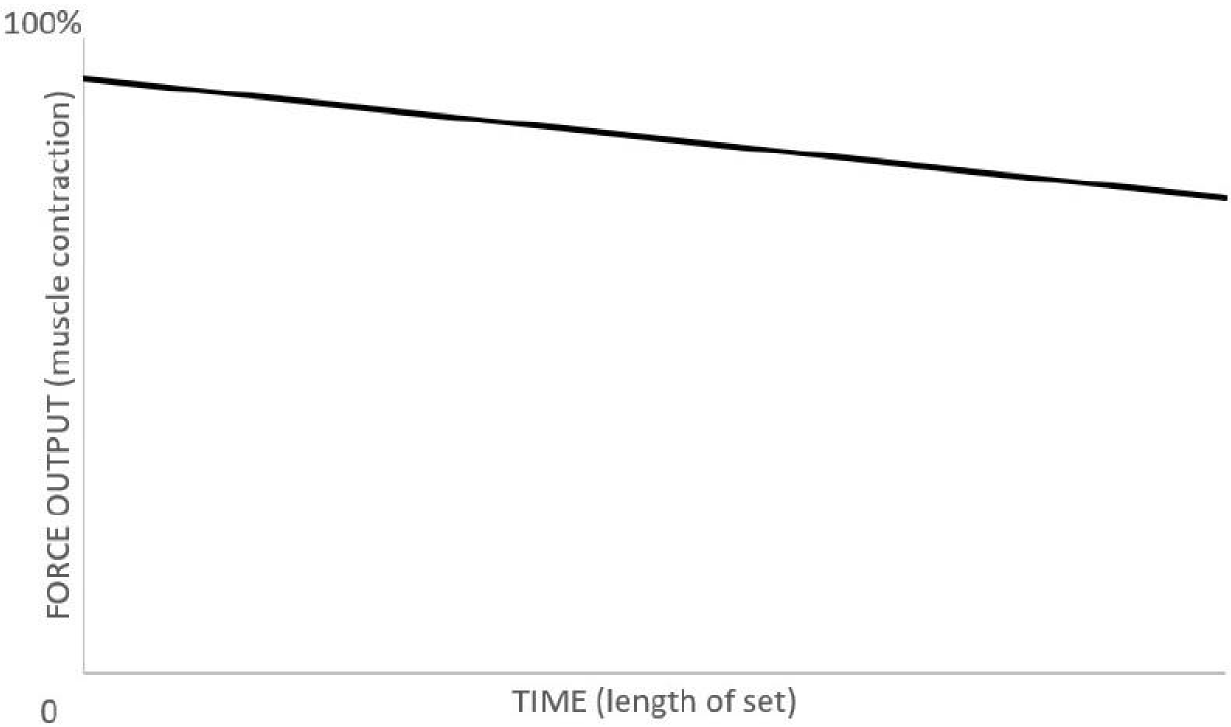
Think of a standard bodybuilding exercise: a barbell press. When you perform a press, the level of force output in your muscles fluctuates. At the bottom of the movement, with the bar on your chest, there is virtually no force involved. As you lift the weight, force increases due to leverage until your upper arms are parallel to the floor, then maxes out; once you pass that point, force decreases, and at the top of the movement, the force radically reduces again. When you lower the bar back down, there is less force required than at any stage of the upwards movement, because gravity assists. The same phenomenon occurs with virtually all conventional lifting; the tension over time fluctuates, often like a sine wave; where tension should be kept *as high as possible*, it actually repetitively *drops down* into a low-tension state, which simply represents wasted time and energy. With isometric

tension, there is no “wasted” fluctuation—the highest potential contraction/force output can be maintained throughout the exercise.

In other words: *it is mathematically impossible for dynamic movements to match isometrics in fatiguing the muscles.*

You probably have subjective experience of this yourself. If you have ever had to pick up a heavy piece of furniture or a fridge and hold it steady briefly, you will have experienced how much “heavier” the load gets after just a few moments, until it becomes almost impossible to hold up. If you struggle on, your biceps will be screaming, cramping, and flushed with waste buildup. Eventually, the muscles will simply give out—seemingly quite quickly, if the weight is heavy. Isometric holds compare very favorably with dynamic movements in terms of short-term fatigue. Individuals who say otherwise are simply not performing them properly.





Traditional lifting tension over time (top) vs isometric tension over time (bottom)

Isometrics is by no means new and untested

Naturally, it might be argued: *but lifting barbells up and down, works. It has made people bigger and stronger for generations. Why change to something new?*

Well, of course isometrics is not new. In terms of bodyweight holds—of the kind found in martial arts and calisthenics—it dates back thousands of years. The old-time strongmen who fathered strength training and bodybuilding as we know it today all used static isometric holds in training and as feats of power. The validity of isometrics, performed correctly, has been substantiated by experience and scientific studies. It has been used and praised by real-world experts from Eugen Sandow to Bruce Lee to Paul Anderson. By comparison, the adjustable barbell is only a little over a century old. If anything, barbells and dumbbells are "new".

This section of the manual is not intended as an attack on conventional methods. We are not suggesting that lifting barbells, dumbbells and machine levers up and down doesn't *work*. The science proves that it does—and, moreover, if your goal is to become good at lifting bars, kettlebells, or bags of sand, then you must use those tools. We're not saying that it's evil, or that you should stop using conventional methods—if you wish to, there are plenty of ways you can combine regular lifting with isometrics (see *bonus chapter*). But just because something works, it doesn't mean we should close our minds to alternatives. For thousands of years, people got around on horses and carts; does that negate the usefulness of jet planes and motor vehicles?

*This is to be expected; if you double your strength, you don't double your muscle size. Much of the improvement comes from neurological recruitment: see page 19f.

It should also be said that isometric exercises are more efficient (than dynamic exercises): they produce their effects with a much smaller training effort.

-Dr John Atha, *Exercise and Sports Science* vol. 9[1]

4. Isometric exercise is more efficient than dynamic exercise.
Training sessions take less time.

Unfortunately, the concept of efficiency is often misunderstood and misused as it applies to resistance training. In the gym or in training articles you might hear or read phrases like; "I don't think the bench press is efficient in building the pecs", or "leg extensions aren't an efficient quad builder". In fact, the authors of these statements are referring to *efficacy*, not *efficiency*. An *effective* exercise is one which produces the desired effect. *Efficiency* is the quality of producing the desired effect, while avoiding wasted resources (energy, time, etc).

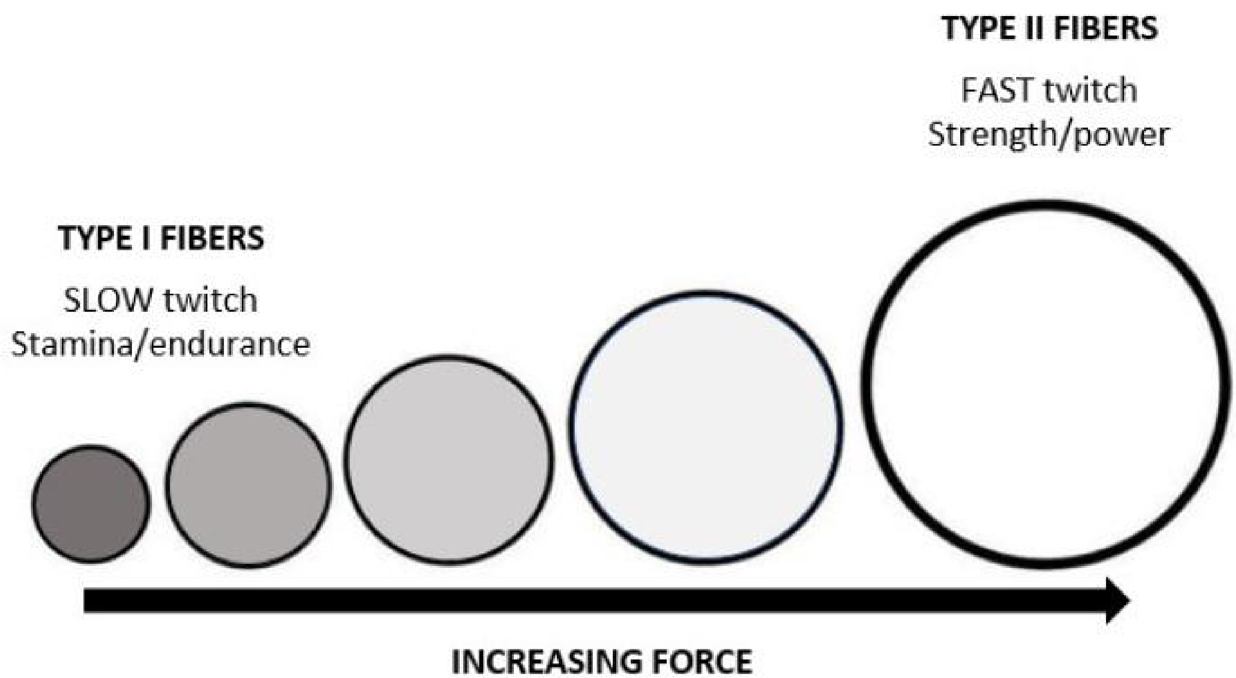
An exercise (or training program, or methodology) can be both effective *and* inefficient. In reality, this is the case with most modern training methods. They get the job done, but with a huge amount of waste. In contrast to most in-gym methods, correct isometric training is the most efficient form of resistance training possible. Understanding why this is, we simply have to clearly understand the concept of *efficiency.*

Efficacy and Henneman's size principle

Based on the above definition, *efficiency* in training is essentially the ratio of effective training (amount of training effect) to resources used:

$$Efficiency = \frac{Energy\ input}{Training\ effect} \ x\ 100$$

So, what comprises "effective" training? A common way to judge the efficacy of a training method is to look at fiber recruitment. When you want to increase strength or size, your goal should be to recruit as many muscle fibers as possible. This is due to a phenomenon in neurology known as *Henneman's size principle,* which states that the largest muscle fibers—Type II fibers, those with the greatest capacity to respond with strength or size increases—are always the last fibers in line to be recruited.[2] As a result—whether strength or size is your goal—you need to recruit the maximum number of muscle fibers you can during your training, in order to reach those large fibers.



Muscle unit recruitment scheme: Henneman's size principle

Henneman's size principle also states that the only way to recruit more fibers is through higher intensity contractions. Lower intensity contractions —light activities, like jogging or walking—only recruit the smaller fibers, the Type I which are useless for size and strength; they adapt to stress by improving their oxidative metabolism—by gaining stamina (which is why champion marathon runners are never big and strong). Type II fibers, on the

other hand, respond to stress by hypertrophy[3]—these are the fibers you want to recruit if you're interested in getting bigger and stronger.

So maximal fiber recruitment is a good way of judging the efficacy of a resistance training program.

Intensity of contraction and fiber recruitment

So—just how intensely do your muscles need to contract to maximize fiber recruitment?

The answer is: *it depends on which muscles you're training.* Different muscles possess different ratios of small-to-large fibers. The forearms and muscles of the ankle, for example, have evolved for endurance, thus have more small fibers; as a result, they reach maximal recruitment at lower levels of contraction (because there are fewer large fibers to recruit with bigger contractions). The big workhorse muscles so loved by strength athletes and bodybuilders—the thighs, chest, back and upper arms—have higher ratios of large fibers, and so require higher levels of contraction before maximal recruitment is obtained.[4]

To give an example, a study published in the journal *Brain Research* demonstrated that *maximal* fiber recruitment of the biceps only occurred at 88% of maximal contraction.[5] So, using the biceps as an example, our goal in resistance training is at least 88% of maximal contraction to be optimally effective.

Anything under 88% and biceps training will not be as effective as it could be. It will still be effective to some degree, it's just that—because energy is being wasted on lower intensity contractions—it is a less efficient way to train. Working at intensities which don't recruit the maximum amount of fibers is analogous to driving a vehicle to a destination in the wrong gear. You'll still get there, but you could've got there faster and with less waste.

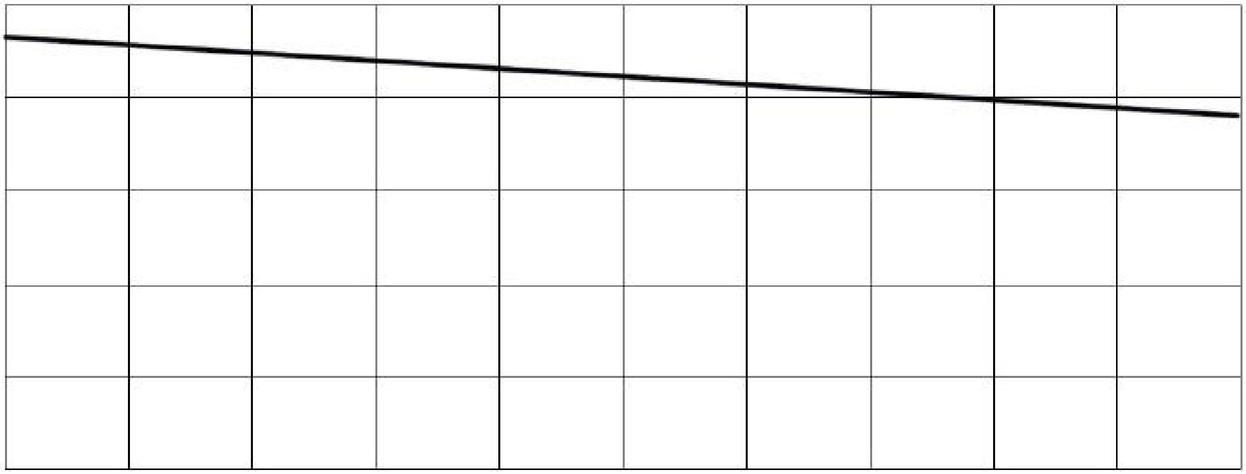
Contraction-Intensity graphs and training efficacy

Now we have a concept of what comprises effective training—*working at levels of contraction which generate maximal fiber recruitment*. How do different methods of training match up to this ideal?

First, let's look at an example of isometric biceps training. Let's say an athlete pushes upwards against the Isochain bar and holds it steady in the curl position. He pushes as hard as he possibly can against the bar, for ten seconds.

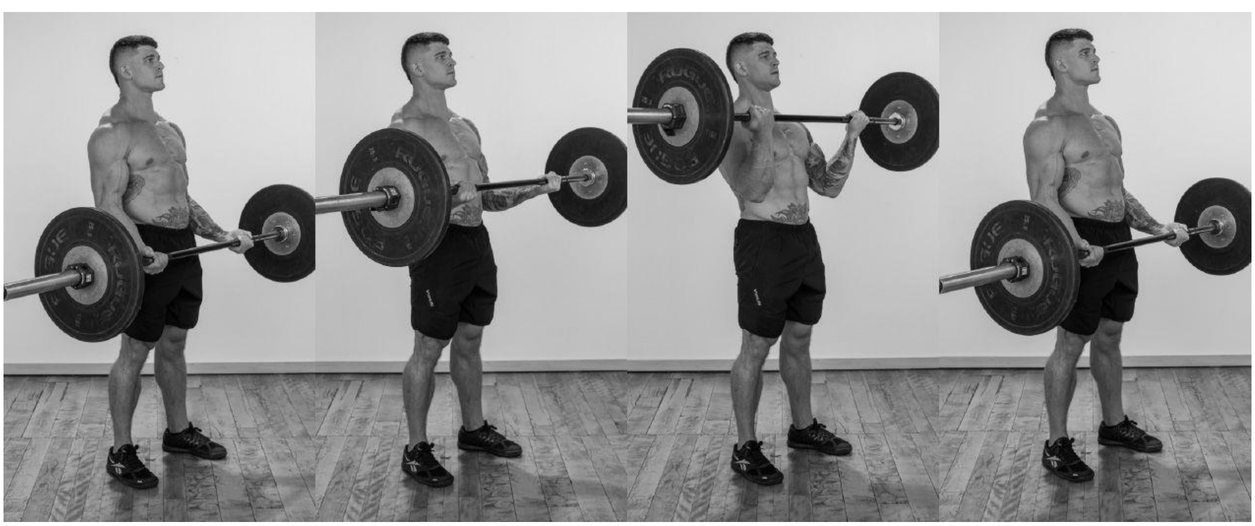
A 10-second Isochain biceps curl

What kind of intensity of contraction is he using? Well, if he is pushing as hard as possible, very quickly it's going to be high as high as he can voluntarily get—easily high enough for maximal muscle fiber recruitment.[6] This cannot be maintained for long however, because as the athlete tires, he will not be able to contract his muscles as hard. As a result, his contraction-intensity graph will look something like this:



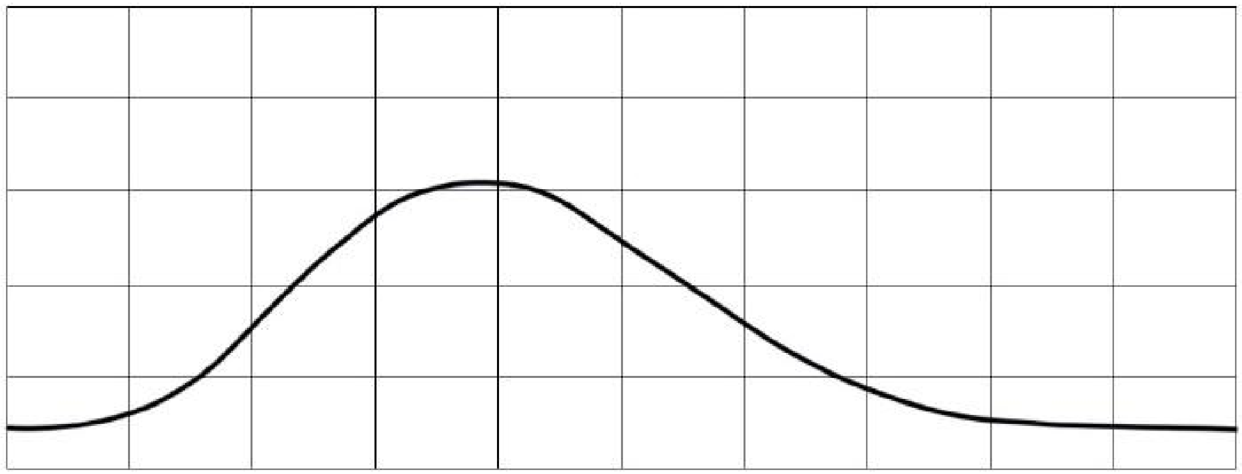
Force of contraction begins at the highest level and evenly and gradually reduces as the athlete tires.

Compare this to the same athlete performing a traditional dynamic exercise, such as barbell curls. We see the same intensity fluctuation we discussed in chapter 3. When you perform a curl, the level of contraction in your muscles fluctuates. At the bottom of the movement, there is virtually no force involved. As you lift the weight, contraction increases due to leverage until your forearms are parallel to the floor, then maxes out; once you pass that point, force decreases, and at the top of the movement, the contraction radically reduces again. When you lower the bar back down, there is less contraction required than at any stage of the upwards movement, because gravity assists.



Barbell biceps curl

If we look at this on a contraction-intensity graph, the result looks something like a modified sine wave:



Force of contraction fluctuates radically during a repetition

In comparing the two graphs, it's easy to see which form of resistance training is the most efficient. Isometric training, correctly performed, maintains muscular contraction at the highest level possible for as long as possible. By contrast, dynamic training causes intensity of contraction to constantly fluctuate. As a result, a significant portion of training time is spent at low levels of contraction.

Why train this way? There really is no reason. Those lower levels of contraction simply represent wasted energy which could better be spent in a target zone of contraction which would recruit and fatigue a greater number of muscle fibers, according to Henneman's principle.

Legendary Soviet strength scientist Yuri Verkhoshansky gives us this telling analysis:

The (isometric) training is very productive, if the time expended is considered. Each 6-second isometric contraction is equivalent in its effect to many dynamic contractions (of the ballistic type) in which maximal force lasts no more than 0.1 second. From a practical standpoint this means that 10 minutes of isometric tension in specially selected exercises can replace a fatiguing hour of training with weights.[7]

More efficient training = less training time

Remember the difference between efficacy and efficiency which we established at the beginning of this chapter. Nobody is suggesting that an exercise which is five times more efficient than another one will produce five times as much growth, or strength. It simply *reduces the waste* by a factor of five.

In reality, dynamic lifting *is* effective. Even at sub-maximal levels of fiber recruitment, some strength development or growth takes place—it is simply submaximal. The athlete in our example only spent perhaps two seconds in the maximal contraction position during his curls—compared to ten seconds for the isometric set—but he or she could have easily added more reps or sets to make up the number and induce muscular fatigue. This is exactly how dynamic training proceeds. It does indeed produce results, but it can only do so with the addition of extra sets and repetitions. Many athletes do in fact spend hours in the gym, endlessly grinding their way through lift after lift. Why would athletes continue to waste so much time and effort? Steinhaus, the physiologist who brought German isometric research to the West in the 1950s, contended that the reason athletes sometimes balked at isometrics was psychological—not biological. He thought that athletes had been taught to *suffer*; and that any system which made training seem easier felt "wrong" to them—even if it was right![8]

In his classic book *Physiology of Muscular Activity*, sports ideologist P. V. Karpovich made the following observation on the startling results of isometric strength training:

It is hard to accept these reports, because they apparently contradict everyday experience. Just think about musclemen working one to two hours per day for at least three days per week in order to develop strength. Maybe they are just wasting their time. Maybe![9]

Isometrics is the most efficient form of resistance training on the planet. Even a quick glance at the contraction-intensity graphs of isometric and dynamic exercises proves that *it is mathematically impossible for dynamic exercises to train the muscles as efficiently as isometrics.* Because no time (or

energy) is wasted performing sub-maximal contractions, the time taken to perform a set is radically reduced. Training volume—the number of sets—is also reduced. As a result, training time is significantly reduced while performing isometrics compared to traditional dynamic methods. In fact, as Verkhoshansky confirms, isometric programs can work the entire body in as little as ten minutes—compared to 45 minutes to an hour for the dynamic equivalent.

The most important thing from the research? Tendons seem to love heavy isometric load and it reduced tendon pain immediately.

-Dr Ebonie Kendra Rio[1]

5. Isometric exercise is less likely to incur injury, either chronic or acute, than dynamic exercise.

Isometrics are safer, protect your joints and save your body from wear and tear.

Even though isometric training has fallen out of favor in modern gymnasiums, there is one area where isometrics never lost its popularity: rehabilitation, or physical therapy. There are two excellent reasons why this is:

A primary advantage of isometric exercise in musculoskeletal rehabilitation lies in the opportunity for localized muscle exercise without moving joints. Strength increases more rapidly in isometric than in dynamic exercises.

-Kuprian, Physical therapy for Sports[2]

The identical qualities which make isometrics so ideal for rehabilitation purposes also make it a remarkably *safe* form of resistance training. Not only does isometrics radically reduce chances of acute injuries—like torn muscles or ligaments—it is also exceptionally good at building strength while avoiding the kind of chronic aches and pains so common in resistance training. In fact, cutting-edge studies show that, far from *generating* joint pain as other training methods typically do, isometrics actually *reduces* it.[3]

If you want to build optimal levels of strength and muscle while protecting and strengthening your joints for life, isometrics is the form of training for you.

Super-safe isometrics: Hooke's law and cortical inhibition

The physics of acute musculoskeletal joint injuries—strains, sprains, tears and breaks—is well understood. These injuries are effects of Hooke's law:

$$F = kx$$

Hooke's law: where F is the force acting on an elastic body, x is the amount of deformation on the body caused by the force, and k is the tautness of the body.

In physical therapy, Hooke's law has been defined thusly:

The strain is proportional to the stress producing it (so long as the strain is not too great, for once the so called "elastic limit" is passed, injury occurs").[4]

Muscles, tendons and bones all possess such a limit. When they are exposed to forces in excess of that limit, injury is the result. The degree of injury is proportionate to that excess force. An example might be a sprained ankle after jumping from too great a height, a torn muscle from lifting a heavy weight, or a broken bone after colliding with another football player.

In all these cases, the stress—or force—which causes the injury is due to two related external factors: either *load* or *momentum*. When these forces surpass the elastic limit of the athlete's tissues, injuries occur. Once you understand this, you have the "secret" as to why isometric training is so safe. Although the forces generated in isometric training can be considerable, these forces are generated internally—by the athlete's own contractions. There is no external load, and no momentum to tackle.

Human muscular contractions are actually capable of causing damage—there are innumerable instances of individuals struck by lightning, whose involuntary muscle contractions have been strong enough to literally break their own bones. However, in the case of *voluntary* muscular contractions—the kind employed in isometric training—the nervous system has evolved a highly protective feedback-based failsafe system. This system, known as cortical inhibition, automatically puts the brake on the muscle contraction before it reaches an unsafe level.[5] As a result, pushing as hard as you possibly can on isometric exercises allows you to maximize your force production without exceeding your body's strain limit, effectively preventing injury.

When performing alternative forms of resistance training, such as explosive work, plyometrics or even regular weight-training, you are much less well protected by cortical inhibition. Although your body will do its best to keep working inside its strain limit, your nervous system is no longer "in charge" as it is with isometrics. The effects of momentum, gravity, and altering leverage/strength through different ranges of motion all mean that that the body can be suddenly "caught out" by excessive levels of force which it is unable to handle.

Compare a maximum isometric squat to a gymnast or parkour traceur landing a flip. In the first case, the forces on the knees are entirely dictated by the nervous system; in the second, they are dictated by the athlete's mass, speed, even landing surface. It the forces become excessive, there is no off-switch—the damage is done. Another example in the latter category might be the weightlifter who explodes up a bar using momentum, only to have it "catch" in the sticking point. With the momentum suddenly gone, the muscles alone might be momentarily incapable of the load, and an injury is the result.[6]

Uncontrolled external forces are typically the cause of acute injuries.

This is not to say, of course, that explosive or uneven modes of training are *bad*. They certainly have their benefits. After all, safety is not the only consideration in training—just as it should not be for life in general. It is merely to explain why isometrics poses such a low risk of acute injury.

Nagging injuries are not inevitable

Chronic—i.e., persistent, recurrent injuries—typically have a different etiology than acute (sudden) injuries, although acute injury can precipitate or contribute to chronic pain. Whenever chronic injury is discussed in a context of athletic training—even in academic studies—one phrase is repeated over and over: that phrase is *wear and tear*. Just ask any intermediate or advanced weightlifter or bodybuilder: repeated resistance training drills can, undoubtedly, lead to differing levels of chronic pain over time.

These chronic injuries can occur at different levels. At the more superficial level we have the kind of niggling aches which constitute tendon injury and tendonitis; sore elbows, painful rotator cuffs in the shoulders, etc. This kind of injury can clear up in weeks or months with the correct therapy. Going deeper we have damage like bursitis and ligament damage, which—where curable—may take months or even years to correct. Then, at a deeper level still, we have the kind of cartilage damage—painful knees, sore lower back, hips, etc.—which can ultimately result in osteoarthritis. The damage sustained as a result of these conditions are not thought to be reversible.

Many trainees have come to accept some type of consistent joint pain as just "part of the game"—the price to be paid for the benefits of heavy training. *But it doesn't have to be this way.* To understand why, let's look more closely at what causes the damage.

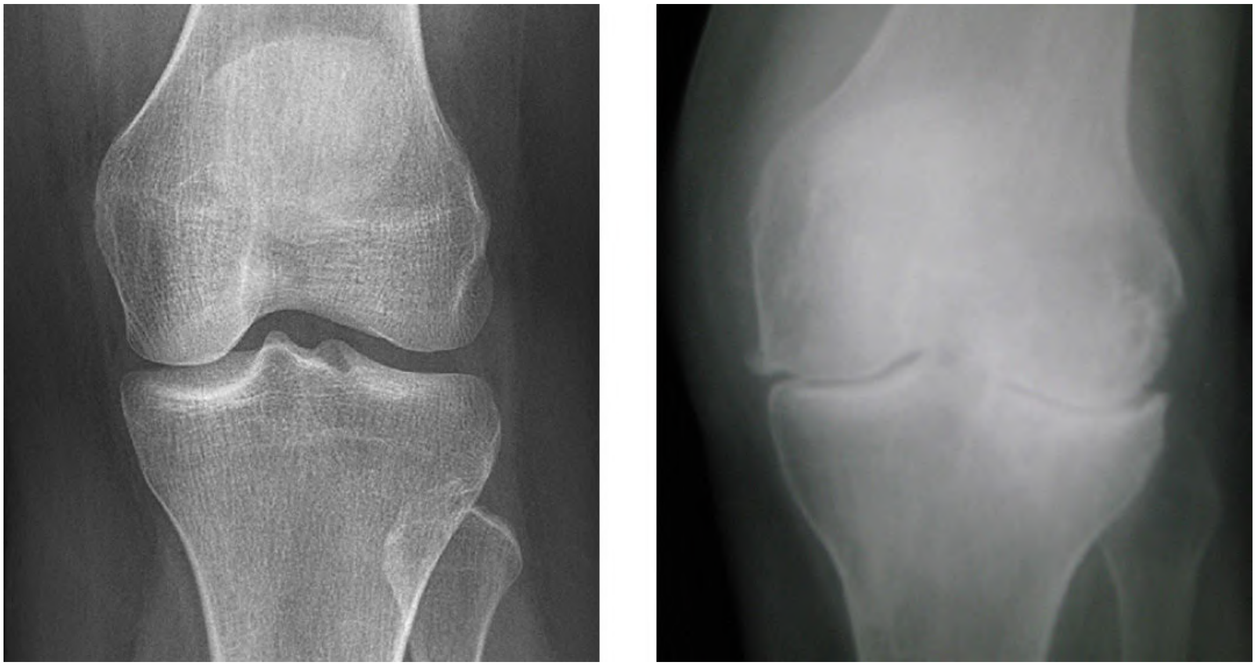
Why is it always the joints?

You might have noticed that the tissue areas typically effected in chronic injuries—the tendons, bursae, cartilage, etc.—are all joint tissues. It's a truism in training that, while muscles can be subject to *acute* (sudden) injuries (e.g., tearing), it's the joints which are largely subject to *chronic* injury and pain. Why is this?

The answer has nothing to do with force, *per se*. The muscles are subject to just as much force as the joints during exercise, and they also act as shock absorbers. It's also not that the joints are "weak links" in the human machine: tendons are, on average, twice as strong as muscle, and possess a tensile strength equivalent to bone. Lack of flexibility is not an answer, either—a flexible substance, like rubber, will wear out more quickly than a hard substance like iron, if both are subject to the same forces.

Joints are subject to higher levels of chronic pain and "wear and tear" than other tissues for one major reason: *mechanical abrasion*. Joints have evolved to articulate, and give us superior ranges of movement. This is necessary for mobility, however the trade-off is that joints suffer proportionately higher levels of friction.

If you have ever had a bad knee, elbow, or shoulder, you may have felt this friction yourself during movement. When you lower into a deep squat, perform a bench press or a barbell curl, you can sometimes feel the tissues in the joint "grinding" away—with the typical result of pain and irritation during and after the exercise.



Healthy knee (left) vs osteoarthritic knee (right). In this case, years of internal abrasion literally ground away the cartilage which cushions the femur and tibia (note the narrowing of the internal space of the joint). The result is bone-on-bone contact, and significant pain.

Abrasion damage is cumulative

Nagging joint injuries are often called *cumulative strain injuries*, although this is misleading: strain is not cumulative—although the effects of mechanical abrasion are. Due to the anatomy of the joints, once damage begins to take its toll it generally gets worse and worse.

The joints are protected from friction by various mechanisms. Even though surfaces rub against one another during joint movements, there is ideally very little friction inside the joints, because of their smooth cartilage, bursae cushioning, and synovial fluid which "oils" the movements.

Normal movements actually stimulate healthy cartilage and synovial fluid circulation. Without movement, there could be no joint health. Unfortunately, if synovial fluid becomes compromised—as the result of overuse, impingement, inflammation, or other factors—friction in the joints significantly increases. With lubrication gone, tissues rub against each other. This in turn can "roughen" the gliding surfaces—damage to cartilage, adhesions in the tendons—which increases the surface area of those tissues, further increasing friction. This leads to more damage, more inflammation, and less synovial fluid, and so the vicious cycle continues.

Increased tendon friction may result in mechanical wear and abrasion of the tendons. This mechanical wear could result in enough damage to the tendons to cause tendinitis. One explanation for the increased friction is a loss of the synovial fluid…synovial fluid is a non-Newtonian viscoelastic fluid that decreases viscosity with increases in shear rate.

-Davis & Palfrey, Advances in Industrial Ergonomics and Safety, vol. IV[7]

Unfortunately for weightlifters, where significant friction already exists in the joints, moving heavy weights multiplies that friction. In physics, the coefficient of friction decreases as force is added, but as we add mass, frictional force increases proportionately. Imagine pressing a piece of sandpaper onto a wall. No matter how hard you press on the sandpaper, it's very hard to do damage to the wall *if it remains still.* Now begin to move the sandpaper up and down, still in contact with the wall. What happens? The sandpaper begins to noticeably damage the wall, even if you don't apply much pressure. If you do begin to push hard, the damage becomes worse, much quicker.

The static solution

When put into context, the solution for minimizing—or even curing—chronic joint pain in resistance training is fairly simple. Chronic joint pain is caused by mechanical abrasions—movement multiplied by load. We can't eliminate the load component—this is what makes the joints and muscles stronger—*so we eliminate the movement.*

This is by no means a new discovery; it is, in fact, intuitive. If you ever speak to master bodybuilders about their training techniques, you will discover that most of them have discovered this instinctively. Typically, gym-trained athletes with pain will at some point begin to slow down their movements, and eventually begin using some kind of static hold.

> I lately employ slow-tempo reps as joint problems are less aggravated and I've discovered an appeal for them as the body grows older. Too, static holds on later reps in different ranges of motion are gaining my interest for the same reason. I find them highly muscle-intense, satisfying and promising.
>
> -Dave Draper, Mr America, Mr World, Mr Universe[8]

Anyone with chronic joint pain as the result of training can explore this phenomenon themselves; with experimentation, you will be able to find some angle in which you can thoroughly contract a muscle without irritating your injury. The logical conclusion of this process is pure isometrics training. Retain the load, build the strength and the muscle, but without the abrasion and damage.

Isometrics and injury prevention

Anecdotally, footballers who have practiced isometrics have noted a definite "armor-building" benefit—isometrics tends to decrease injury potential. Russian researchers tested this and discovered the reason: isometrics have the capacity to strengthen ligaments—the fibrous connective tissue that holds the skeleton together.[9] Ligaments are often ground zero for debilitating joint injuries, particularly to the knee and shoulder.[10] Tendons are the other major location for joint injuries, and Japanese research has demonstrated than isometric training can also effectively increase the tensile strength of human tendons.[11]

A later, more conclusive study in 2016 proved that isometric training does indeed have the power to significantly reduce athletic injuries, when employed as a means of general physical preparation:

The analysis of the obtained data from the examination of players continuously doing isometric exercises indicates that the level of their physical fitness is higher. The following regularity has been found: the longer the period of continuous isometric exercises is, the higher the physical fitness level is, the lower the injury rate and fatigue are and, consequently, the greater the improvement of performance is.

-Bolotin & Bakalev[12]

There's more: instant isometric pain-relief

As an added bonus—recent research[13] indicates that, not only does isometric exercise *not* contribute to joint pain, where pain already exists, isometrics may eliminate it: at least as well as some medications. It can also instantly relieve some of the dysfunction and weakness caused by the pain. Pain is ubiquitous in high-level athletics, so the potential of these findings is enormous; this research has already found practical applications in elite sports physiotherapy. In the words of the lead researcher:

First of all, we found that people with patellar tendon pain had HUGE amounts of cortical inhibition (as if their motor cortex was trying to limit the use of the quads). However, a single bout of heavy (70% MVC) isometrics reduced tendon pain pretty much instantly (and lasted at least 45 minutes), it also reduced the associated muscle inhibition, resulting in an increase in muscle strength. It wasn't just about heavy load though as this cross over study also examined isotonic (concentric / eccentric) contractions and found no effect on inhibition, and that isometrics were superior for pain relief...People can do isometrics prior to sport as it doesn't fatigue their muscles (in fact strength was improved in the study). Equally we have athletes that use isometrics after they play or train and they seem to pull up better the next day.

-Dr Ebonie Rio[14]

If you don't have any chronic pain—fantastic. Why not employ isometrics as the mainstay of your training, and miss out on it completely? There's very little satisfaction in being old and in pain as a price for being young and strong. Why not seize the best of both worlds, and be young and strong, *then* grow old and strong? Isometric training can do that for you.

We know that muscle recovery from isotonic exercise occurs more slowly than recovery from isometric exercise, but the recovery curves have similarities.

-*Therapeutic Exercise for Musculoskeletal Injuries*[1]

6. Isometric exercise can be performed more frequently than dynamic exercise.

You can train in isometrics more often, and make more rapid progress.

Isometric training causes less microtrauma to the muscles than regular dynamic forms of resistance training.[2] The result? You are less sore following the training—the kind of post-training inflammation and irritation called *delayed onset muscle soreness* (DOMS). You are also less functionally impaired.[3] DOMS isn't just annoying; it's associated with significant loss of strength and range-of-motion following training. After a hard weights session, this period of lower function can last for days—despite therapeutic modalities (massage, TENS, etc).[4]

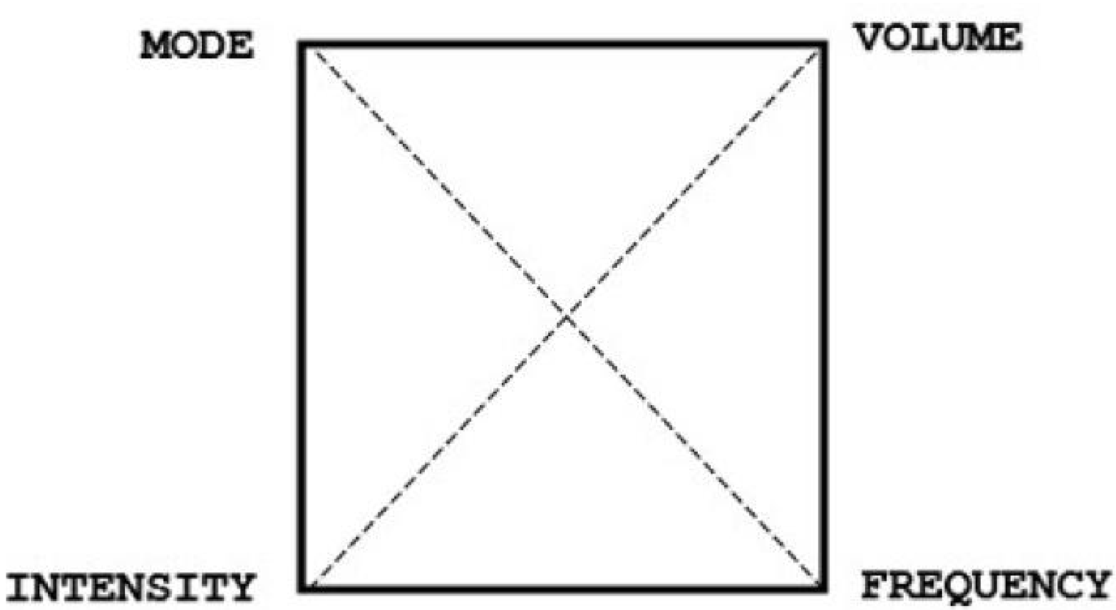
Obviously, minimizing DOMS has immediate benefits to the athlete—they are back to peak functioning extremely rapidly. They also suffer less pain as a result of their training; and this in turn means that motivation for hard training isn't impaired. (There is strong evidence that DOMS interferes with training motivation.[5] It's difficult to keep returning to any activity which hurts a lot.)

There is a much more important benefit, however. Since athletes recover much more rapidly from isometrics than dynamic resistance training, they are able to train much more *frequently*.

The importance of frequency in training

There are four fundamental variables to any kind of training program:[6]

- Mode is **what** you do;
- Volume is **how much** you do;
- Intensity is **how hard** you do it; and
- Frequency is **how often** you do it.



The Square of Programming

For more information on using these variables, see *The PCC Instructor's Manual,* chapters 25-26.

In modern fitness culture, there is a huge amount of publicity given to the idea of *intensity* in training—particularly intensity of effort. The harder you work, the more likely you are to wind up a winner, right? In fact—probably not. Current research indicates that it is the *frequency* of training or practice —not the *intensity*—that turns also-rans into champions.[7]

Higher frequency equals more progress

In terms of resistance training, simple math tells us why this is. Let's say, for example, that you perform a maximally intense training session, and make 3% progress—your strength improves 3% as a result of that single session. Let's also say that the session leaves you so drained and sore, that you can't work the same muscles again for four days. Compare this to a less intense session where you train hard, but don't push to the absolute limit. In this more moderate session, you only make 2% progress—2/3rds the progress of the first one—however you are able to train the same muscles again in two days.

Which training session is best? Well the first session is more intense and results in more short-term progress. However, if you keep working out this way for 40 days, you will accumulate 30% progress (3% every 4 days). With the more moderate sessions, you would accumulate 40% of progress over forty days (2% every 2 days).

The practical message—if you can find a method which allows you to train *more frequently*, you will end up making more progress in the long run. In terms of resistance training, isometrics is the ultimate exemplar of this kind of method.

Isometrics and fatigue

You can perform isometrics sessions *more often* than is the case with traditional dynamic training methods. This is because dynamic resistance training takes much longer to recover from than isometric training. There is a general (although, by no means universal) consensus in modern training that a muscle should be worked by regular, dynamic exercises no more than every 48 hours. In fact, even this may not be long enough to fully recover.[8] Many elite powerlifters train each lift hard only once per week.[9] There may be some science behind their programming: some studies indicate that muscle recovery still hasn't taken place 96 hours after hard training.[10]

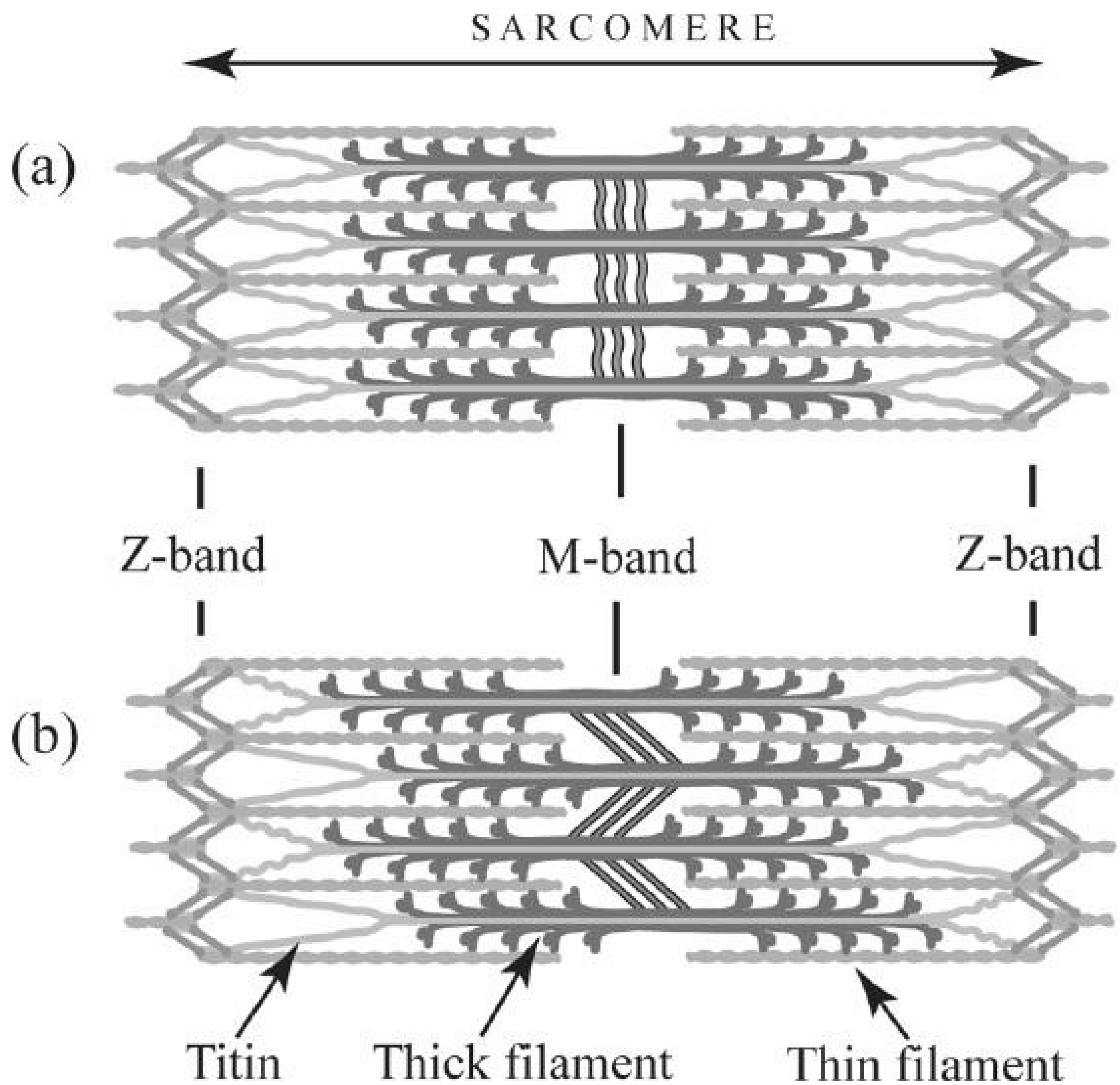
Contrast this with isometric strength training. The most famous comprehensive scientific analysis of isometrics was undertaken by the German physiologist Theodore Hettinger M.D. After exhaustive

experimental scrutiny, Hettinger concluded that not only could subjects easily recover from optimal levels of isometric training in *under 24 hours,* but that daily training was ideal in terms of strength-building.[11] In fact, not only did the subjects in the German studies recover adequately from daily isometrics, their strength levels improved at a seemingly superhuman rate of 5% per day![12] Follow-up studies have corroborated Hettinger and Muller's findings regarding isometric training frequency.[13]

DOMS, sliding filaments and popping sarcomeres

There are several factors involved in inter-session recovery. Joint pain (see chapter 4) and psychology[14] are two examples, however the phenomena of DOMS discussed above is perhaps the most significant; the reduced-strength effect, as well as the associated pain, can significantly hamper training efforts, thereby necessitating extended periods between training sessions.

DOMS is the result of microtrauma—damage to the soft tissues on a cellular level.[15] It used to be believed that lactic acid buildup—the kind that makes you feel the "burning" in your muscles during hard exercise—was to blame for DOMS. We now know that this is not the case.[16] One popular current model which explains DOMS is the *popping sarcomere hypothesis.*[17] Sarcomeres are the little machines in your muscles which allow them to contract. They are much, much smaller than muscle fibers. Your muscles are made up of tubular fibers (called *myocytes*), which in turn are made up of protein-based chains called *myofibrils*. Myofibrils are made up of tiny *sarcomeres*. (A single muscle fiber may contain 100,000 sarcomeres). When you contract your muscles, filaments of protein in the sarcomeres shorten, sliding over each other. This is called the *sliding filament theory* of muscle contraction.[18]

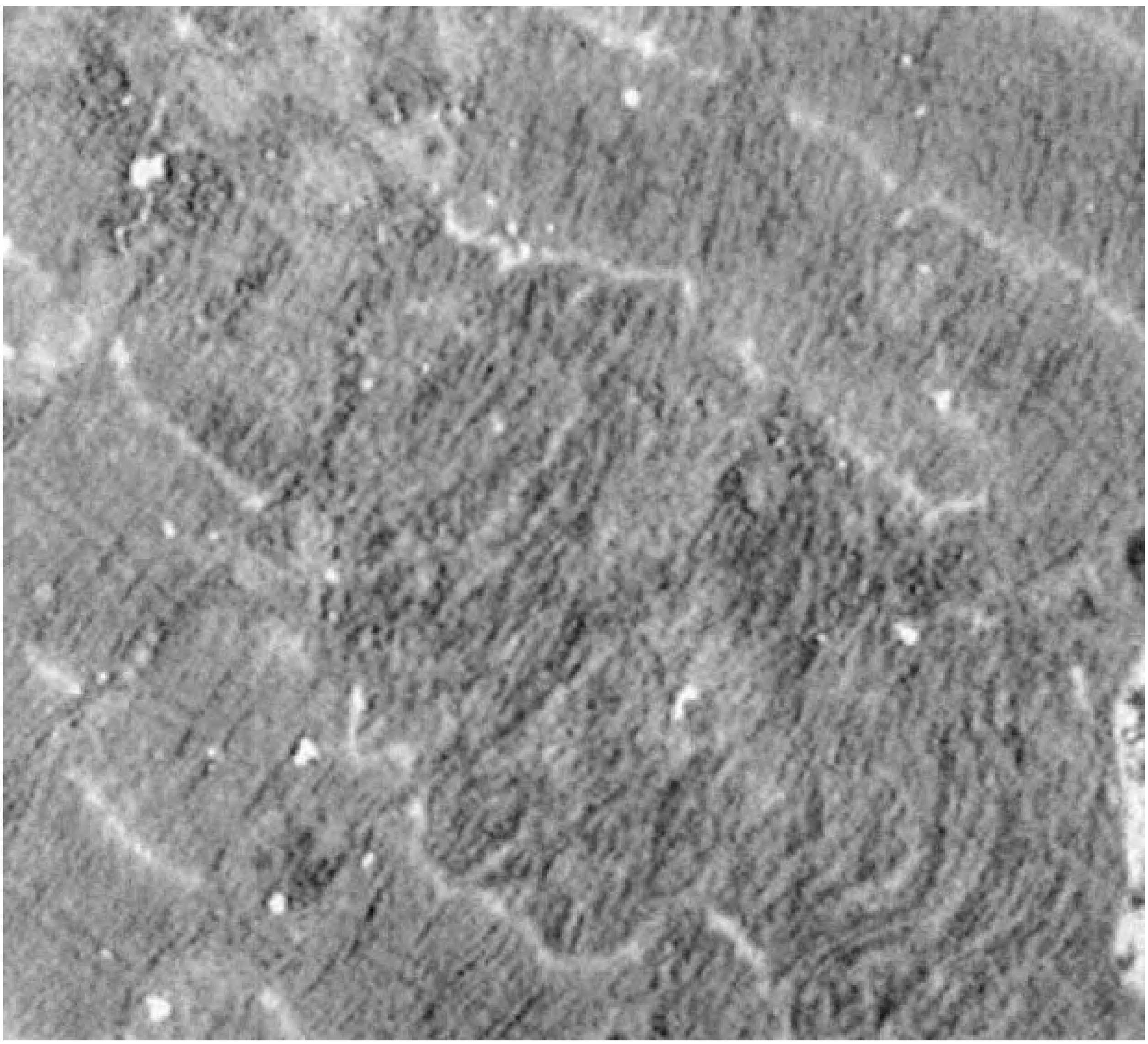


Sliding filaments are what cause muscle contraction[19]

If the muscles begin moving under a heavy enough load, the filaments in the sarcomeres are unable to maintain their integrity and they "pop". This mechanical damage disrupts the calcium homeostasis inside the muscles[20] and results in inflammation.[21] As the hours pass, a chemical cascade follows which sees prostaglandins released, which sensitize the nociceptors—pain receptors—which results in the soreness. The soreness tells us to "back off" as the damage heals.

Movement under load is the cause of sarcomere damage

It's clear from modern studies that contraction—mechanical tension—is what builds strength and muscle. However, the kind of microtrauma which causes delayed onset muscle soreness and hampers recovery is not caused by contraction or tension—it is caused by *movement* under tension. In particular, the science seems to indicate that *eccentric* movements should take the majority of the blame here. It's been well-established for decades that the lengthening phase of exercise does the bulk of the damage, literally tearing sarcomeres apart.[22] In fact, heavy eccentric (negative) contractions can cause so much damage that muscle function is reduced for over two weeks following training.[23] By contrast, isometric holds cause minimal muscle damage or post-exercise soreness.[24]



Damage of muscle following eccentric exercise (via electron microscope).[25] *The lengthening movement literally shreds muscle fibers up—is it any wonder that it takes so much time to recover from heavy weight-training?*

Concentric movements—although they can cause soreness by themselves[26]—do not seem to cause nearly as much damage. Unfortunately, it's almost impossible to use only concentrics during a workout, since we typically have to lower weights (eccentric movements) every time we lift them. (The only exceptions would be if we had training partners lower our weights on every rep; or if we could literally drop the weights after every rep—not too sensible during a bench press.) Even if we could only use concentrics during heavy training, some researchers suggest that eccentrics would inevitably begin slipping into our movements, particularly as we tire.[27]

During isometric training, there is no need for high-load, long-stroke eccentric motions—after a contraction, the athlete simply relaxes his or her muscles. No heavy weight needs to be lowered. As a result, isometrics is an incredibly pure method of training, and the lack of movement is what results in such a low level of damage and soreness.[28]

With isometrics an athlete has access to maximum intensity muscle contractions—the optimal trigger for strength and development—with minimum microtrauma or post-exercise recovery. The best of both worlds.

The Fenn effect and recovery

Another reason why isometric training doesn't leave athletes so fatigued following a training session is down to a little-known but well-established quirk of muscle energetics called the *Fenn effect*.

This effect was discovered in the 1920's by a brilliant biologist, Wallace Osgood Fenn, who, as well as being chairman of the University of Rochester Physiology Department, was head of the American Physiological Society. Fenn's work was grounded in complex thermodynamics applied to muscle contractions; in brief, Fenn proved that *concentric* muscle contractions

require more energy (up to triple the energy) and produce significantly more internal heat than equivalent *isometric* muscle contractions.[29]

Over time, physiologists came to realize that this effect has drastic consequences to muscles on a cellular level; for example, the energy utilization of dynamically-trained muscles means that they not only burn up more precious intracellular resources, they also produce far more waste buildup than statically-trained muscles. For example, the rate of ATP (*adenosine triphosphate*) breakdown in moving muscle contractions is up to three times greater than that for isometric contractions.[30] This in turn results in greatly increased production of metabolites such as lactic acid, ADP, and chloride, among others.[31] These waste products must all be gradually removed by the system, to keep the muscles functioning.

The Fenn effect essentially means that dynamic contractions are more costly to the cellular environment of the muscles, from a viewpoint of chemical energy, recovery of resources, and detoxification of waste buildup. This explains why an isometric training session—even one exploiting very heavy loads—typically leaves athletes feeling fresh and ready to work out again, compared to similar sessions with conventional dynamic lifts, which tend to induce immediate fatigue.

Science and experience > subjective prejudice

As with anything in any literature, there's no need to believe any of the studies quoted here. You can easily explore this issue yourself. Perform an isometric workout, and see how you feel in 24 hours. Certainly, once you have accommodated to isometrics, you will feel virtually no soreness, and experience zero functional impairment. If you are well conditioned, you actually feel fully recovered ten minutes after training—in fact, isometrics usually leave you energized and stronger than before you performed them.[32] This is a far cry from the exhausted, beaten-up feeling many athletes experience after a hard session with the weights.

Unfortunately, the absence of the "beat-up" feeling traditional dynamics confers may be one of the reasons so many trainees are prejudiced against isometrics. *If the training doesn't leave me exhausted and sore, it can't be*

effective, they reason. This old-fashioned notion—*no pain, no gain*—is a fallacy based on subjective psychological bias rather than science. Research has established that soreness and exhaustion after a workout are not related to productive results, either in strength gains or hypertrophy.

...it is commonly believed that muscle damage is necessary for size and strength gain. However, it seems unlikely that muscle damage and/or muscle soreness are essential for muscle adaptation.

-Nosaka, K. et al. (2003) *Muscle Damage in Resistance Training*—*is muscle damage necessary for strength gain and hypertrophy?*[33]

Soreness following a workout is the result of microtrauma: *damage*, not *stimulation*. If this idea seems initially counterintuitive—*I'm sore, it must have been a good workou*t—take a moment to reflect on the following: after running a marathon or performing three hours of flexibility exercises, an athlete will likely become terribly sore, and feel drained for days. They will not, however, gain any strength or muscle. Soreness and fatigue may make us *feel* like we've worked hard, but in reality, they are not good indicators of productive resistance training. The only reliable indicator is the ability of the athlete to handle progressively increased load—and all the studies prove that isometrics is unbeatable in this regard.

...one would expect to find clear evidence that dynamic exercise is better than static exercise for improving performance in dynamic functional activities. Surprisingly such evidence has not been strong.

-*Medicine and Science in Sports and Exercise* No. 27[1]

7. Isometric Questions and Answers: *The Current Science*

Will isometrics make me slow?

It's perhaps intuitive to imagine that by training very *slowly*—or, indeed, not moving at all, as is the case with isometrics—an athlete will adapt by becoming *slower*. In fact, studies show that this notion is incorrect: *static isometric training can increase speed and jump height just as effectively as explosive training*.[2]

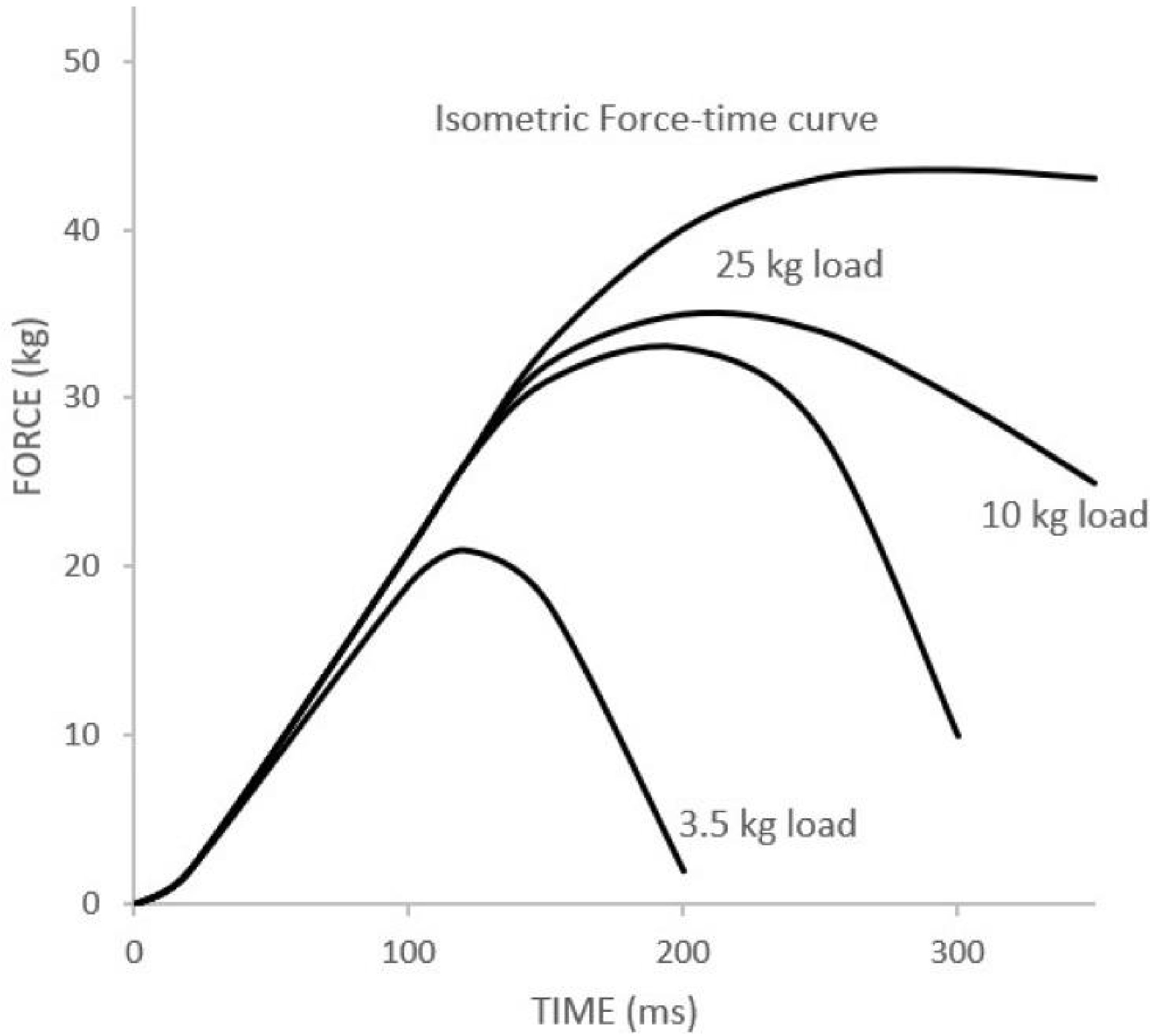
One must realize that there is a high correlation between maximal isometric strength and movement speed. An increase in strength brings about an increase in movement speed.

-Dr Dietmar Schmidtbleicher[3]

How can *not moving* make you faster and more explosive? There are two primary reasons. The first reason has to do with the physics of speed. Naturally explosive movements—from jumping, to hitting a baseball, to cleaning a barbell—typically begin from a dead stop. The force-velocity relationship* demands that high levels of force are required in the initial stages of such movements:

...movements such as the vertical jump start from zero velocity. Thus even slow speed strength is critical for accelerating the body early in the movement."

-Morrissey, et al.[4]



The degree of correlation between isometric strength and movement speed increases when the load gets heavier. Why? Because speed-strength requires starting strength.[5]

Nature bears this out. Fast, explosive animals like lions often possess a significant amount of muscle mass. So do sprinters, compared to marathon runners. Strong muscles and fast body movements go hand-in-hand. The old notion that a strong person must be "muscle bound" is a long-dead myth.[6]

The second reason has to do with fiber types. In order to be fast, an athlete primarily requires powerful fast-twitch muscle fibers—these Type II fibers are capable of contracting up to *ten times* faster than their slow twitch cousins. However, sports researchers now understand you don't necessarily need to train your fast-twitch fibers by moving quickly: you can also develop them by exerting large levels of force. (This is due to Henneman's size principle; large fibers are only recruited when really necessary, such as under a large load. Fast twitch fibers are the largest type of fibers.) Paradoxically, isometric training involves higher levels of force than dynamic training: as a result, it develops fast twitch fibers and can make an athlete faster—even if they aren't training for speed. This increased speed from isometric strength training doesn't just apply to simple linear movements like jumping; it also transfers to more complex athletic motions, such as cycling, sprinting, climbing and martial arts striking power.[7]

If you want to train fast-twitch muscles, you have to move fast, right? No, you don't. In fact, you can increase your injury risk in doing that. Being fast-twitch muscle only means that it's the fastest to fire and the fastest to fatigue. Trying to build that by moving fast works your momentum much more than your actual muscle. The difference in which muscle fibers you build comes not from your training speed, but your training intensity.

-Jarell Lindsey[8]

As an added bonus, isometrics not only compares well to explosiveness training in terms of results, it is also far safer for the joints. A study published in the *Journal of Strength and Conditioning Research* concluded:

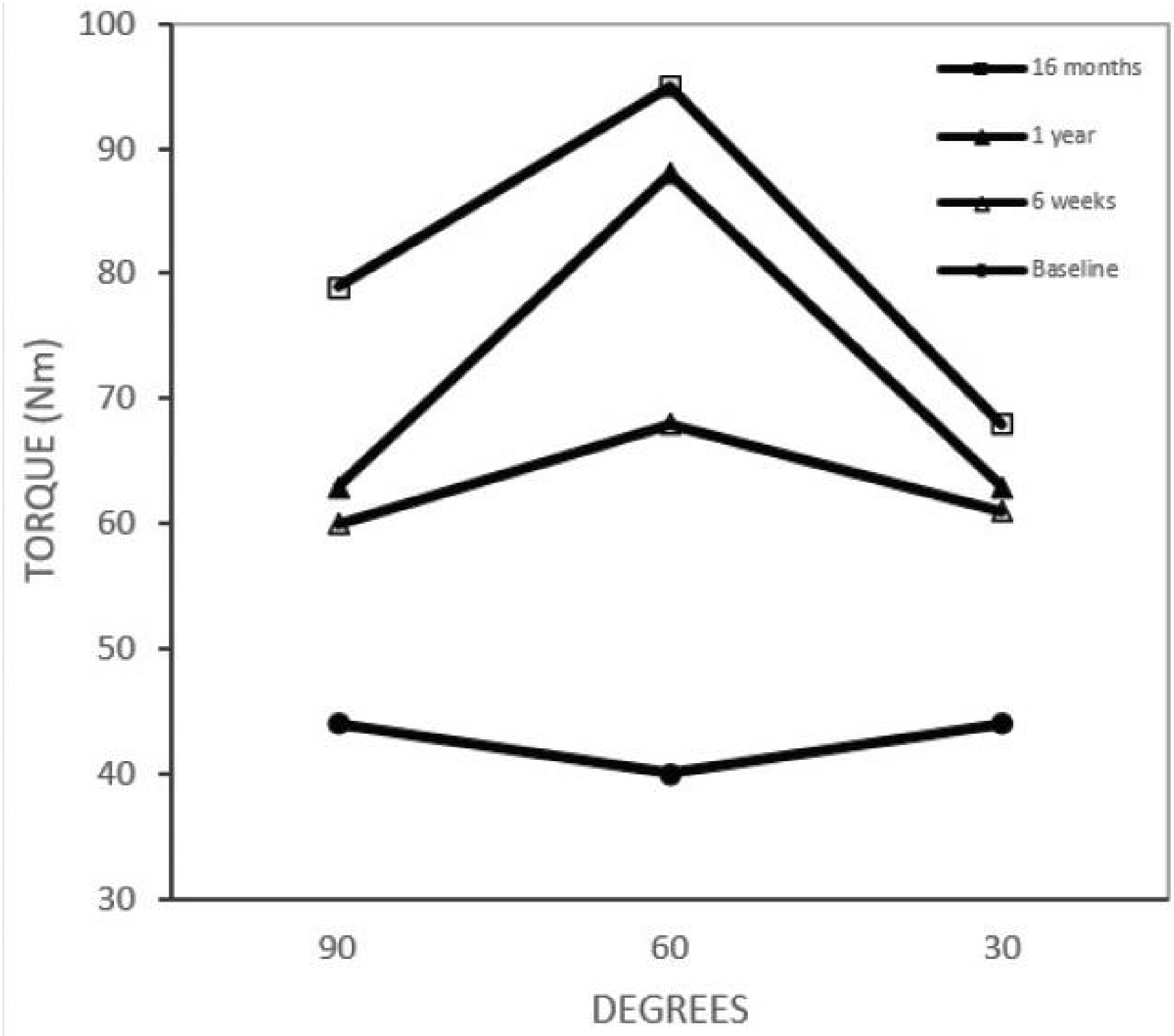
Plyometric training has been shown to place large stresses on the body, which can lead to a potential for injury, whereas explosive isometric training has been shown here to provide similar benefits to that of plyometric training with respect to the measured variables, but with reduced impact forces, and would therefore provide a useful adjunct for athletic training programs within a 6-week time frame.[9]

Is isometric strength only angle-specific?

If you train an isometric exercise with the muscles held at one angle—let's say, with the biceps at 90 degrees—your muscles rapidly become stronger at holding that angle. This is unquestionable, and supported by numerous studies.[10]

However, many researchers have questioned how much that strength gain is *angle-specific*—whether it only applies to the trained angle—or whether that strength transfers to alternate, untrained angles. How far does that developed strength overflow? 20 degrees? 30 degrees? The entire range of motion?

In training articles you will sometimes read statements to the affect that *isometric strength only transfers 20 degrees from the trained angle.* This idea is typically repeated as if it were gospel, however you rarely see this kind of dogmatic statement in the scientific literature, because there is little consensus about the specific nature of strength transfer.[11,12] What the studies do generally show is that although the training gains are greatest at the training angle—angular specificity—there is still *some* transfer at all other muscle angles, whether those angles are trained or not: it's just that the gains at the untrained angles are not as great. It seems that the *law of diminishing returns* applies; the further from the training angle, the lower the transfer:



In this 12-month study, the quadriceps were trained only at a 60-degree angle. After a year, strength also increased hugely at 90 and 30 degrees—untrained angles. The greatest strength gain was at the 60-degree training angle.[13]

This means that those critics who argue that angular-specificity means that isometrics training doesn't build "complete strength" do not fully understand the issue. Angular specificity *does not* mean that if you train in one position, *you only become strong in that position.* (It would be absurd to suggest that a biceps muscle which is inhumanly strong at 90 degrees would suddenly become a weak biceps at, say, 40 degrees.) All angular specificity means is that if you only train at one position, your strength gains *are*

greatest in that position. It doesn't mean that you gain no strength in other angles—*you do.*

> ...as with all strength measurements, there is a specific force or torque versus joint angle curve for each type of muscle contraction, so that it is highly unlikely that a strength increase would be confined to a very precise angle and nowhere else in the range.
>
> -Verkhoshansky[14]

Some researchers have even doubted the notion of angular specificity at all; reasoning that, the different strength-potentials of muscles at various angles are due almost entirely to the *length-tension relationship*. This is a well-established law of myology which states that skeletal muscle possesses its highest strength at an ideal length, typically it's resting length (often, but not exclusively, the "midpoint" of an exercise). Muscle strength proportionately decreases when stretched or shortened beyond this point, due to the function of elastic proteins (such as *actin*) within muscle cells.[15] Other scientists have cast doubt on the research methods of studies which have emphasized the concept of angular specificity, finding that—when mathematical errors due to body mechanics are accounted for—differences in isometric strength at divergent angles are a function of leverage, rather than muscle activity.[16]

Can isometrics help me lose weight?

It has been understood for a long time that exercise—plus sensible nutritional choices—will result in fat loss. Typically, very active exercises—such as running or cycling—are selected as optimal weight-loss exercises because they burn a *relatively* high number of calories. Isometrics, on the other hand, is a highly energy efficient form of exercise.[17] As a result, the *practice* of isometrics burns relatively few calories. For this reason, isometrics is not traditionally viewed as part of a potential fat-loss protocol.

In 2007 a group of researchers from the Departments of Physical Therapy in Loma Linda University and Azusa Pacific University developed a

single-blind randomized study to see whether isometric exercise worked to encourage fat-loss. A study population were given a brief isometric training program to follow on a daily basis. The subjects were not required to follow a rigid dietary program, but were instead given five simple dietary recommendations (for example: try to eat healthy foods; drink eight glasses of water a day; etc). The results were dramatic:

In the present investigation, it is not surprising that with isometric training, there was a marked increase in muscle strength. Thus, the isometric exercise program worked well in terms of increasing muscle strength. It is significant that there was a 20% increase in muscle strength with only seven minutes of work each day.

But the program, while increasing muscle strength, was equally matched by the benefits of weight and girth loss. The loss in girth after 2 weeks for the average person at the waist was 3.0 cm which was equivalent to one pant or dress size.

But the program, while increasing muscle strength, was equally matched by the benefits of weight and girth loss. The loss in girth after 2 weeks for the average person at the waist was 3.0 cm which was equivalent to one pant or dress size. After 4 weeks the loss increased to 3.3 cm. The weight loss for some subjects in the first two weeks was as high as 8.4 kg while after 4 weeks some subjects lost as much as 10.1 kg in in body weight.[18]

As an added health bonus, subjects also displayed a dramatic decrease in LDL cholesterol, as well as a significant drop in heart rate and blood pressure.

Why did isometrics work so well? It may be that the true fat-loss benefit of isometrics lies in increasing muscle size and/or density. Added muscle is active tissue which continually burns calories throughout the day—whether you are eating, working, or even sleeping.[19] (The major reason why males are generally able lose weight easier than females is due to their higher levels of muscle mass.[20])

This effect, plus nutritional measures, is the most effective means by which to lose body fat, not drawn-out periods of aerobic exercise.

Can isometrics provide cardiovascular benefits?

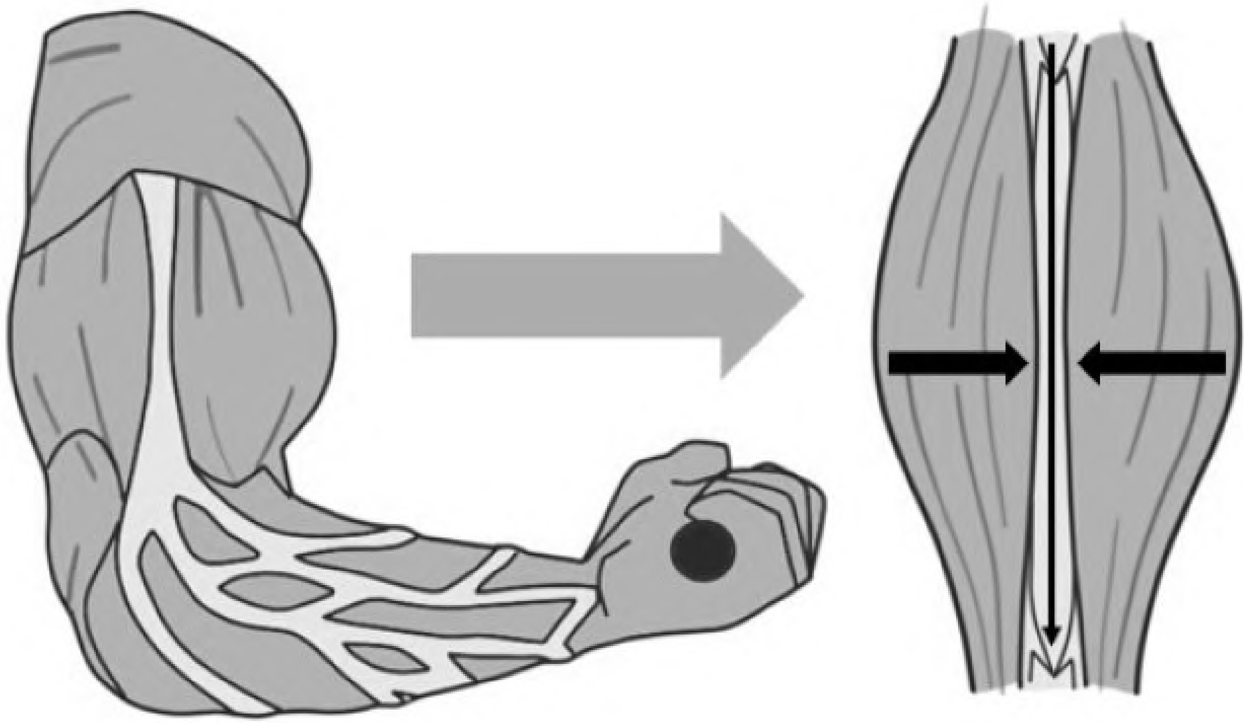
It is often suggested—by armchair theorists—that isometrics have little or no training effect on heart health. This is probably because it is being instinctively juxtaposed to traditional cardiovascular drills, such as running or cycling, which involve large amounts of movement.

In fact, nothing could be further from the truth. The relationship between cardiac activity and isometric training has been well studied, and it is now appreciated that isometrics have a unique effect on the cardiovascular system:

...both systolic and diastolic pressure markedly rise with isometric exercise in order to maintain blood flow to actively contracting skeletal muscles, thus producing a marked increase in both heart rate and mean arterial pressure. These increases are proportional to the amount of skeletal muscle that is contracting (for example, hand grip requires less increase than leg extension, which requires less than heavy weight lifting). Therefore, at any given level of oxygen uptake, vigorous isometric exercise raises heart rate, raises systemic vascular resistance, and lowers stroke volume and cardiac output more than dynamic exercise does.

-Lavie, C. J. et al. (2001) *Exercise and the Heart: Risks, Benefits, and Recommendations for Providing Exercise Prescriptions*[21]

Essentially, when you squeeze your muscles and hold that position—as in isometrics—your blood vessels become mechanically constricted by the tight muscles. As a result, the entire cardiovascular system has to work much harder to pump blood around the body. This, in turn, gives the heart and blood vessels a powerful workout. This might be termed the cardiovascular *isometric response*, and researchers are beginning to understand that it has major potential benefits for heart health.



The isometric response: mechanical constriction of the muscles forces the cardiovascular system to temporarily work harder—improving heart health and lowering blood pressure.

A fundamental means of establishing heart health is resting heart rate (RHR).[22] The stronger a heart is, the more powerfully it can pump blood around the body on a beat-per-beat basis: as a result, individuals with strong, healthy hearts tend to have a lower RHR than people with weak hearts. For example: professional athletes, with very powerful hearts, may have an RHR of just 30 beats per minute: sedentary couch potatoes can have RHRs of 80, 90, or more beats per minute.[23] Studies have shown that an eight-week course of isometrics reduces the average resting heart rate by *over eight beats per minute*.[24] Furthermore, this study only utilized handgrip training: can you imagine the improvements in heart health with total-body isometrics?

This beneficial result compares remarkably well to traditional aerobic exercise, previously considered the "gold standard" for heart health: a similar study involving a twelve-week course of aerobic exercise only reduced RHR by less than 4 beats per minute—literally half the amount achieved by isometrics.[25]

Is isometrics bad for your blood pressure?

As explained in the previous answer, isometrics temporarily raises your blood pressure.[26] Because your muscles remain tense and contracted during isometric training—however briefly—the circulatory system in the area of those muscles becomes mechanically constricted. Just as if the pipes in any fluid system became suddenly narrower, the pressure would increase, so it is with blood pressure. After the cessation of isometrics, blood pressure quickly returns to normal. The rise in blood pressure seen in isometrics is absolutely safe for healthy individuals.[27]

Temporary fluctuations in blood pressure are perfectly normal, and occur as a result of all forms of exercise; and both isotonic and isometric exercise increase mean blood pressure to the same extent.[28] Far from being *bad* for your blood pressure, several studies have indicated that isometrics training is possibly the best way to *reduce* blood pressure. (This is probably because the *isometric response*—the forcing of the blood vessels to constrict and work harder—actually *strengthens* the circulatory system, reducing overall blood pressure.) Whatever the biology, this effect is well-known in scientific literature.[29]

In one study[30] individuals performing isometric exercises three times per week over eight weeks saw their systolic pressure drop by 12.5 points, and their diastolic plunge by a huge 14.9 points—*that's nearly two points per week.* This is a huge, potentially life-saving drop—with a low amount of training (only around twenty minutes, three times per week) in a relatively short span of time. In fact, benefits may come even quicker than that—more recent studies have noted significant blood pressure drops from as little as four weeks of isometric training.[31] A comprehensive meta-analysis of the existing research, published in the *Journal of Hypertension,* concluded that, far from being avoided, "isometric exercise may be of value as part of lifestyle advice in maintaining a desirable blood pressure."[32]

Although isometric or combined isometric and dynamic (resistance) exercise has traditionally been discouraged in patients with coronary disease, it appears that resistance exercise is less hazardous than was once presumed, particularly in patients with good aerobic fitness and normal or

near-normal left ventricular (LV) systolic function. Isometric exercise, regardless of the % MVC, failed to elicit angina pectoris, ischemic ST-segment depression, or threatening ventricular arrhythmias among selected (low-risk) cardiac patients. Furthermore epidemiological data indicate that regular exposure to isometric activity at the work place lowers the 5 year hypertension incidence rate by 29%...Hence it may be prescribed as part of lifestyle modification and as an adjunct or alternative to antihypertensive therapy in maintaining a desirable blood pressure level that will help in improving quality of life and reducing the risk of cardiovascular disease.

-Sandhu, et al. (2014) Scholars Journal of Applied Medical Sciences[33]

If you have been diagnosed with heart issues or hypertension, you should consult with your doctor before initiating an isometrics program, or any new training method.

If static strength is so much greater than dynamic strength, how is it that Olympic weightlifters—who move quickly—lift heavier weights than any other athletes?

Olympic weightlifting is a great sport; it develops strength, power, and flexibility as well as coordination. It is not, however, immune from the force-velocity relationship. As a result of the large weights used, it is impossible for weightlifters to achieve very high velocities, despite their acceleration during the lifts. The more weight you use, the slower you must move.

When an expert weightlifter performs a snatch, for example, the velocity of the bar tops out at around 1.6 meters per second.[34] In terms of human speed, that is not very fast: a trained boxer can punch at 14 meters per second.[35]

The impressiveness of weightlifting speed relative to the weight on the bar is also misleading: the most explosive portion of an Olympic lift does not occur when the athlete *lifts* the heavy bar, but when he or she pulls him or herself *under* the bar.

Can older individuals perform isometrics?

Experts agree that as we approach old age, exercise ceases to become *optional* and increasingly becomes *essential* if we wish to retain functionality.[36] Strength training is of particular significance in this regard.[37]

Far from being something to avoid, anti-ageing researchers have predicted that, in the future, isometrics will play a significant role in keeping elderly populations safe and strong:

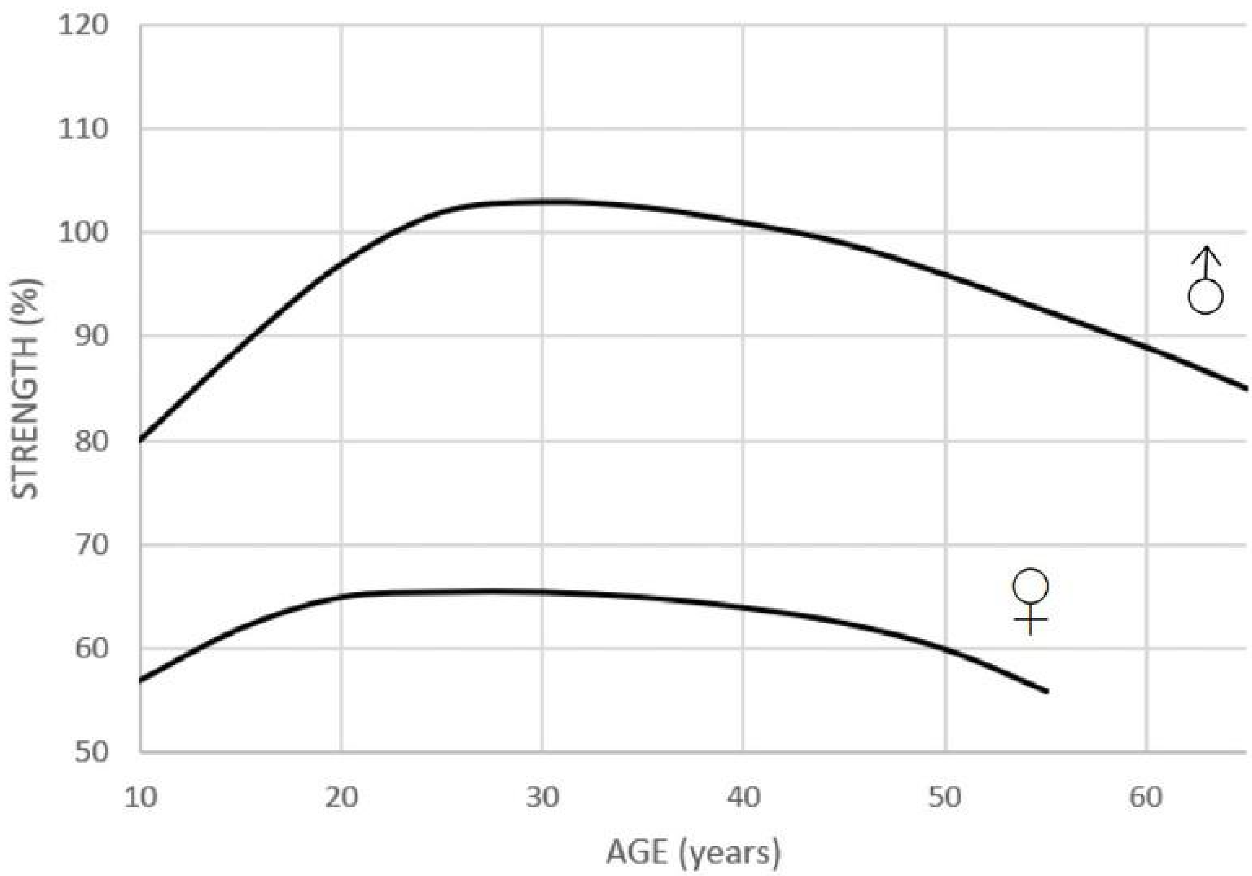
> The present results indicate that maximal isometric strength tests provide useful information about physical functional capacity among elderly people. These findings also suggest that the maintenance of adequate strength could be favourable to the mobility of older persons.
>
> -Rantanen, et al: Age and Ageing vol. 23, no. 2[38]

The great Norb Schemansky performs a perfect snatch. The first two photos show him pulling the weight up, relatively slowly; he then explosively pulls himself under the weight (bottom left) before standing up with it.

Isometrics is the ideal form of strength training for older or elderly populations, because it is kinder on the joints, and reduces the risk of injury. Isometric training is unique, in that it boasts a complete absence of momentum; this makes it the safest form of resistance training because

there are no unexpected external forces which may result in injury[39]: the central nervous system autoregulates its own force levels.

Unlike dynamic strength, which declines dramatically with age (2.6-4.1% per year from its peak[40]) isometric strength appears more loyal; with strength at age 60 only being around 15% less than at its peak during the third decade of life.[41]



Asmussen graph: Decline in isometric strength as we age is slow—even with no training. With training, the decline can be reversed.[42]

In fact, far from being a drawback (as might be assumed) research shows that being older might actually be an *advantage* when it comes to excelling in isometric training. A comprehensive Swedish study of isometric strength and stamina in different age groups found that age did nothing to decrease endurance during static holds. This seemed to be largely because older subjects demonstrably possessed far superior *pain tolerance* (possibly due to accumulated life experience) than the younger athletes. This improved pain-

control seemed to be progressive; the youngest subjects had the least pain control, the oldest had the best. The researchers tested 128 individuals aged from 17 to 70; the subject with the best isometric endurance was a man of 69 years of age.[43]

Astonishingly, isometric training may even protect older populations from Alzheimer's Disease. A recent paper in *Frontiers in Aging Neuroscience* strongly recommended the future exploration of isometric training for older people to preserve cognition and memory:

Isometric exercise training may also play an effective role in the management of vascular risk factors at the Mild Cognitive Impairment stage of Alzheimer's Disease and may prove to be a significant strategy in the prevention, attenuation or delay of progression to Alzheimer's Disease. A plausible hypothesis is that the reactive hyperemia (i.e., blood flow) stimulated by isometric exercise training initiates a cascade of vascular, neurotrophic and neuro-endocrine events that lead to improvements in cognitive function.[44]

*See chapter 2.

PART II

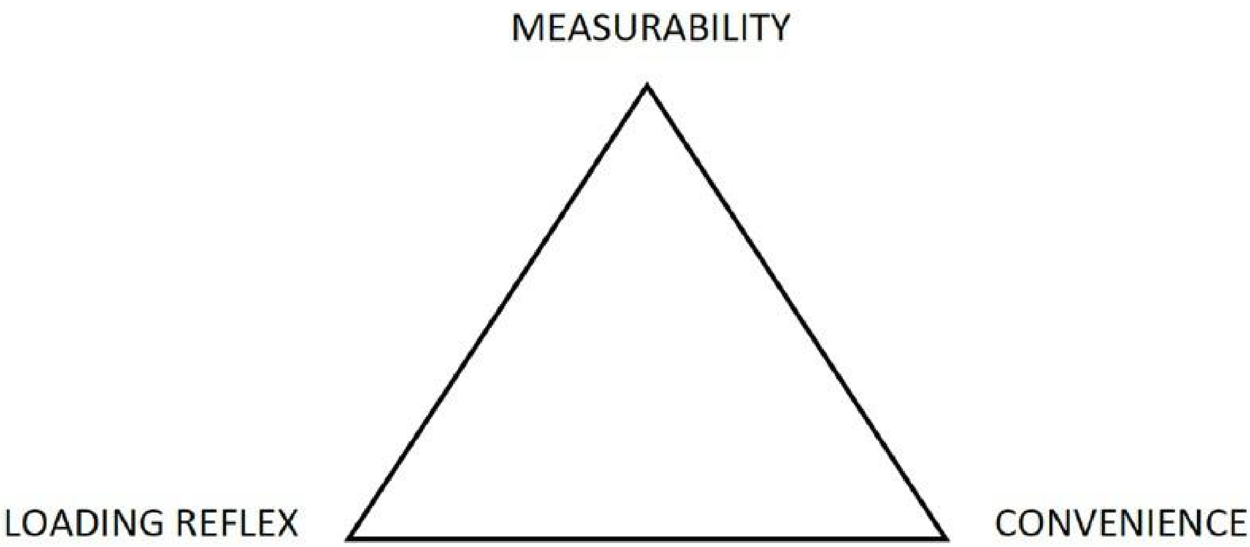
ISOMETRICS: THE TECHNOLOGY

That which is measured, improves.

-Peter F. Drucker[1]

8. The Isochain
The Ultimate Isometric Device

The perfect isometric workout would fulfil three criteria: it would be *convenient*, it would be *measurable*, and it would exploit the *loading reflex.*



Convenience **–** the athlete would be able to train alone, without requiring a well-stocked gym, or heavy, cumbersome equipment.

Measurability – the athlete would be able to know exactly how much force they were exerting on any given exercise.

Loading reflex **–** the athlete would be able to experience a real-world lifting effect, rather than simply tensing his or her muscles and imagining

one. (We’ll explain this one more in a little bit.)

These three factors are absolutely fundamental to isometric training as a method. Unfortunately, in reality these three are like health, love, and money—it seems virtually impossible to have them all at once.

To appreciate why this is, let’s consider a few examples.

Isometric exercises are probably as old as human history. They are certainly as old as recorded history. Ancient Oriental scrolls and carvings depict warriors training in the *horse stance*—an isometric posture still used by martial artists today to develop strength and stamina.

This kind of equipment-free (or equipment light) training has always made isometrics appealing. Convenience has always been a major factor of this kind of isometric drill—it can be performed practically anywhere. No big gym or comprehensive weight set is required. Ancient Shaolin monks were said to push vigorously against pillars or sturdy trees to build power, going by the theory that a human opponent would seem weak in comparison. The famous Dynamic Tension method of Charles Atlas, where you press one hand against the other, is a more modern example of the same principle; you push your hands together at various angles, one fighting the other for ground in a static tournament. These kinds of techniques train the body, and because they can be done anywhere, anytime, they are about as convenient as physical training gets.


Charles Atlas in his prime.

These methods all share *two* identical drawbacks, however. The first of these is a lack of *measurability*. Imagine the example of pushing hard against a huge, solid tree; yes, this is an isometric exercise. It may even be good exercise, but the problem is, there is no way to know how *hard* you are pushing against the tree—how much force you are expressing. As a result, you

don't know if you are doing a good job, or if you are terribly weak. With zero feedback, you have no external motivation to try harder, or to improve.

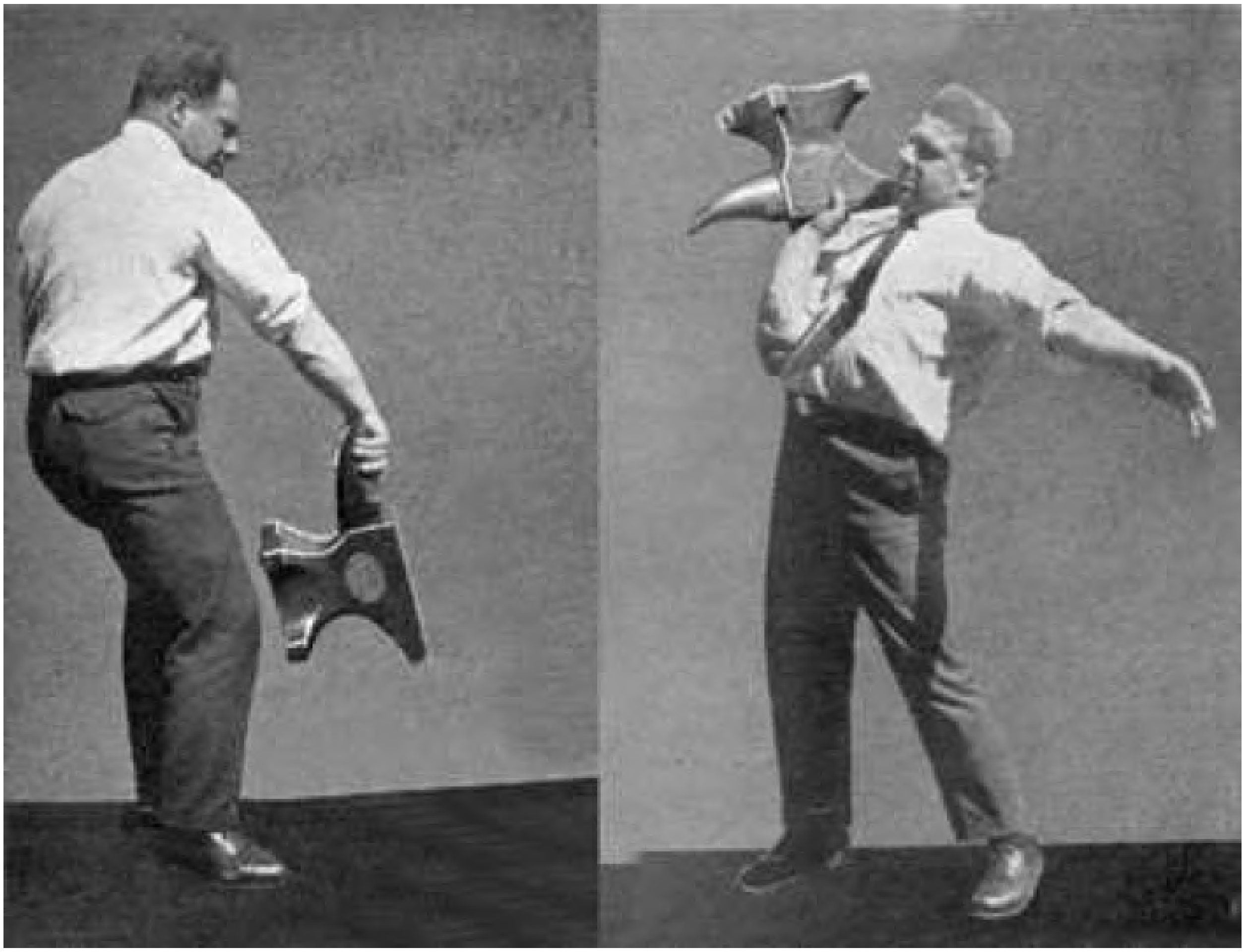
In addition, if you keep going back to pushing the tree, day-in, day-out, although you may get stronger, you have no idea *how much* stronger. Are you doing this right, or wrong? For these reasons and more, measurability is a key component of *all* productive training. Without measurability, training is like being lost and trying to get somewhere new without a map. You have no idea where you are, or where you're going.

Without measurability, training is like being lost and trying to get somewhere new without a map. You have no idea where you are, or where you're going.

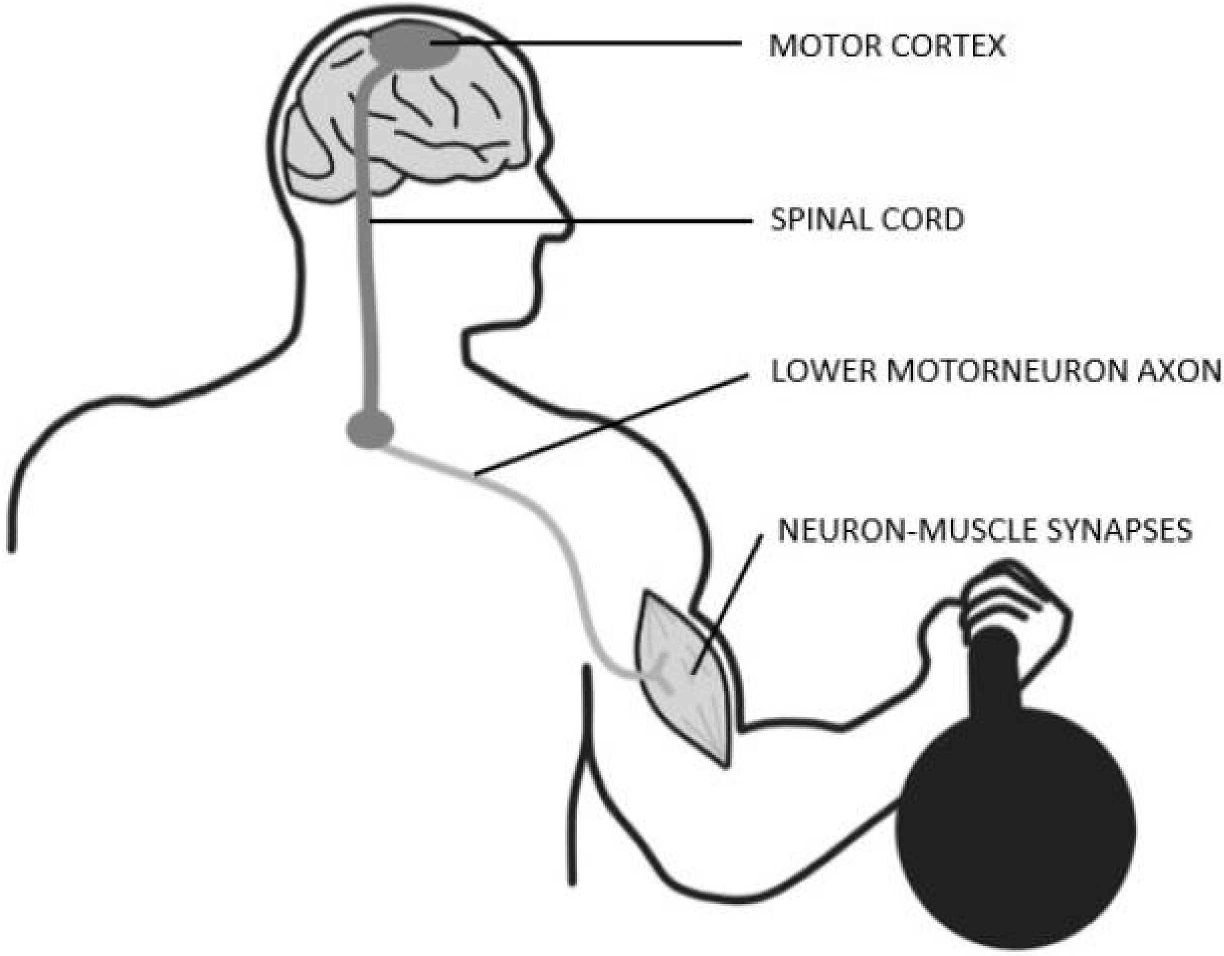
This lack of measurability is the main reason that, during the twentieth century, isometric training techniques lost ground to barbell and machine training methods; you can (to some degree) measure the force you are using on a barbell because it has a given weight written on the side.

The second drawback of this kind of old-style isometric training is that the *loading reflex* is absent. What does this mean? Imagine again pushing against a solid tree or a wall. Even if you try to push as hard as you possibly can, you will be unable to recruit nearly as much strength as your muscles are capable of generating under a "live" load. This is because your nervous system has put subconscious blocks in place to prevent you from damaging your muscles without a damn good reason.* (Try this—it's almost impossible to push to a point of strain!)

Now, imagine that a sudden gust of wind has toppled over that tree or wall, and you are under it! You have to lock your arms and body under the crushing object just to keep it off you. You are still performing isometrics, but suddenly, you are able to exert a much higher percentage of your strength potential, because your nervous system senses the "live" opposing load, and turns off the blocks it has set in place. Suddenly you are able to exert your full voluntary strength. We may call this the *loading reflex.*



Being “live”, weights, barbells, dumbbells and machines all exploit the loading reflex; however, traditional isometrics does not. Whenever you read studies (like those mentioned in Part I) which record how incredible isometrics is as a training method, you can bet these have been conducted using weights, springs or resistance machines held in place (often with multiple assistants required) to be able to exploit this loading reflex.



The loading reflex: the brain places blocks—cortical inhibition—on the muscles reaching their maximum power output unless the nervous system senses a genuine, "live" external load. For this reason, self-resistance or loadless isometrics can never generate the high force levels of loaded work, such as using an Isochain.

The 4 Levels of Loading Reflex

Cortical inhibition is your brain's capacity to "turn down" the dial on muscle power for safety and homeostasis. The *loading reflex* is your nervous system's ability to suppress cortical inhibition and recruit more motor units—increase strength—to tackle the unexpected. There are 4 progressive levels of loading reflex:

LEVEL 1: LOADLESS

FORCE: Internal—produced by antagonistic muscles (a.k.a. *isotension*)

LOADING REFLEX: Minimal

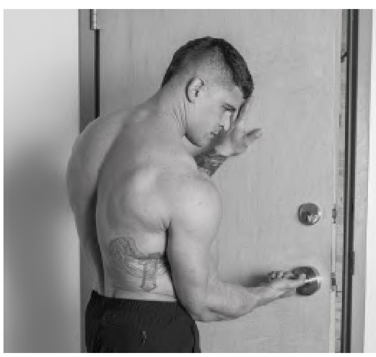
CORTICAL INHIBITION: Maximal

LEVEL 2: SELF-RESISTANCE

FORCE: Internal—produced by different muscle groups on the body

LOADING REFLEX: Low

CORTICAL INHIBITION: High



LEVEL 3. STATIC-STATE

FORCE: External—provided by fixed, unmoving object, such as a doorway or brick wall (a.k.a. *overcoming* isometrics)

LOADING REFLEX: Medium

CORTICAL INHIBITION: Medium

LEVEL 4: LIVE RESISTANCE

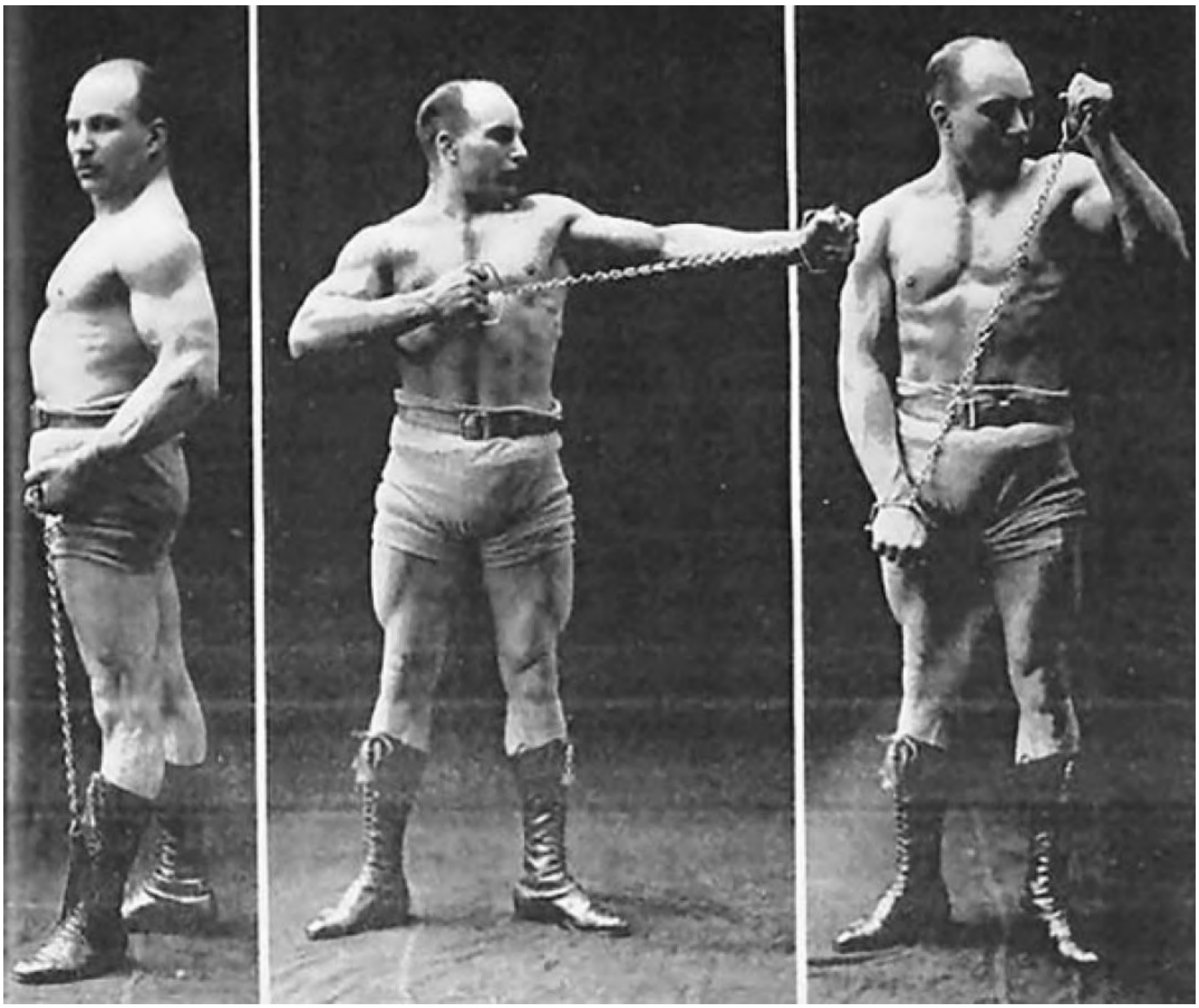
FORCE: External—produced by object actively pushing back, such as a free weight, or spring (a.k.a.*yielding* isometrics)

LOADING REFLEX: Maximum

CORTICAL INHIBITION: Minimum

When strongmen in the nineteenth century began trying to "modernize" isometric exercises they did so by introducing chain training. One of the last

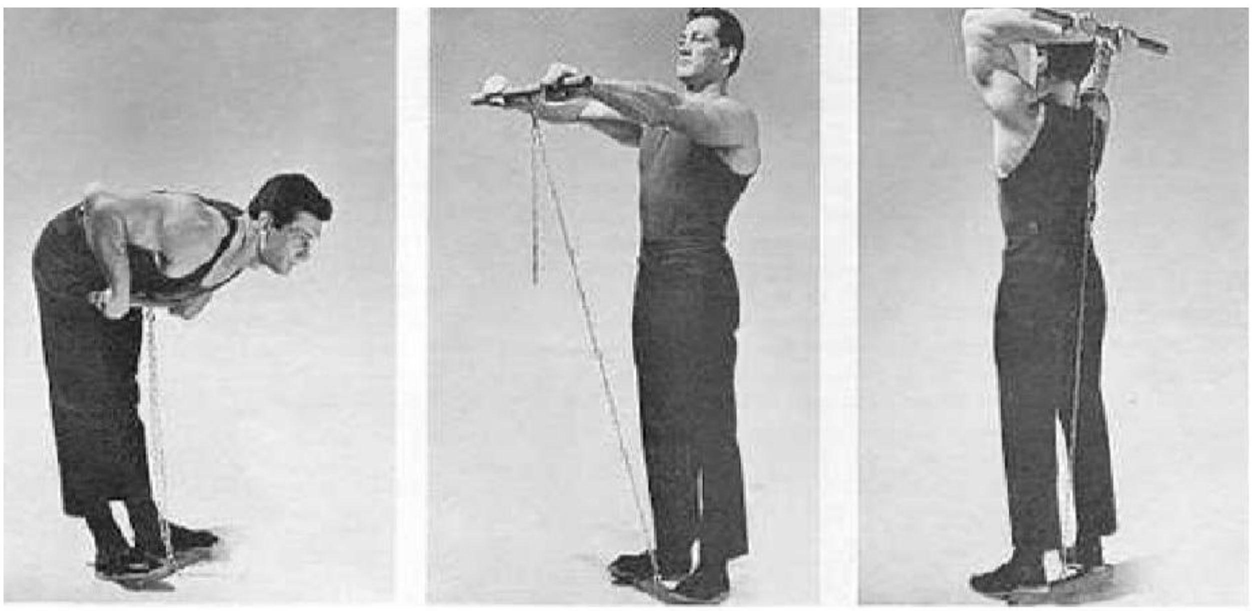
great icons of this era was Alexander "Iron Samson" Zass (born 1888), the strongest man on the planet at one time, and a great advocate of isometrics. Originally a prisoner of war, Zass built his strength by pulling against the chains he was bound by—eventually becoming so powerful that he was able to escape the four different camps he was imprisoned in. Unlike pushing horizontally against a tree, a wall, or a stone column, Zass's chain-exercises could also be performed *vertically*: you push or pull up. In this, the chain exercises mimic real weights, which have to be lifted against gravity.



Zass chain training at multiple angles

As a result, chain-pulling methods proved very popular in strength-and-fitness circles, and they continued to evolve in the twentieth century; at first, two bars were attached to the chain (as a handle, and as a base to stand on).

Over time, the bottom bar was replaced with a more comfortable baseplate, and the chain length was made adjustable, so different exercises could be performed. This classic chain-and-bar was quickly considered the isometric training device *par excellence*. By the 1960’s all kinds of athletes were using the chain-and-bar, from kung fu experts to Olympic lifters. Although this kind of training clearly worked—athletes felt they were getting stronger—and they were also convenient—no gym was required—the chain-and-bar still suffered from the same old problems: lack of measurability, and lack of a loading reflex.



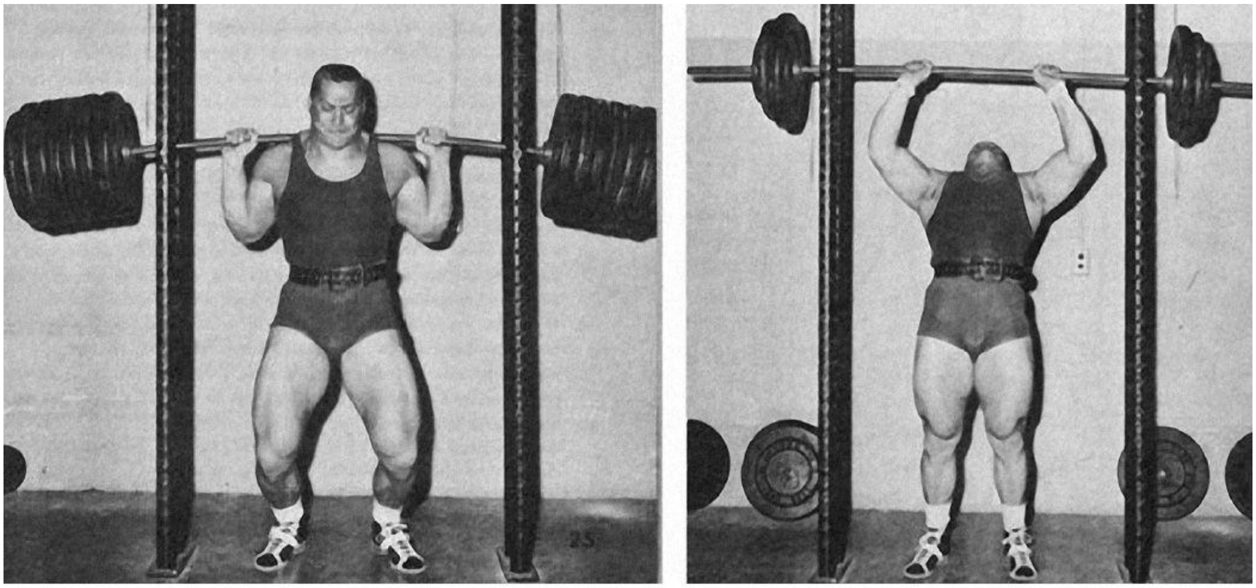
✗	✗	✓
MEASURABILITY	**LOADING REFLEX**	**CONVENIENCE**

These were serious issues for strength coaches and ideologists during the middle of the last century. By this point, scientific studies were beginning to stream in which showed a *superhuman* 5% daily increase in strength through isometric training!—but for most athletes without access to special machines, the measurability and loading factors were too big of a setback.

As a result, the USA weightlifting coach (and, to many, the father of modern strength training) Bob Hoffman devised a measurable way to perform isometrics with a "live" load. He invented and patented the *isometric rack* (now called a *power rack*). This was essentially a wooden rack with a loaded barbell held on metal pins. The strength athlete would step inside the rack and (just barely) lift the barbell off the pins, holding it for a few seconds before setting it down again.

This method worked—fast. It built several champions and became renowned as an incredible method for building strength. You know how much weight was on the bar, so it solved the problem of measurability; and because the athlete was holding a real weight up, he could exploit the loading reflex, also.

However, although numerous champions and professionals exploited Hoffman's isometric methods, the system never caught on with the rest of the fitness world, or the general public. Why? Because isometrics had taken a full 180-degree turn. Thanks to the rack, isometrics were *measurable,* and allowed athletes to engage their *loading reflexes* for maximum power: but isometrics were no longer *convenient*. To perform Hoffman's method required an expensive rack, and typically, a coach to time your lifts and ensure safety. Also, since isometrics amplifies power so efficiently, athletes were soon required to use gigantic, *bar-bending* weights; many, many weight plates were necessary. Almost overnight, that very quality—convenience—which had made isometrics so accessible and popular for thousands of years was suddenly completely gone.



MEASURABILITY	LOADING REFLEX	CONVENIENCE
✓	✓	✗

Of course, every action has a reaction, and the strength world is no different. Almost as Hoffman's rack established serious isometric training as something that had to be done in a gym, athletes—still craving simplicity and convenience from isometrics—began to rebel. One person who listened to their complaints was Gert Kölbel. Kölbel—a German engineer—responded by inventing an isometric device which became known worldwide—the *Bullworker*.

The Bullworker was manufactured and marketed in the sixties, and became a sensation; it popularized isometrics beyond Hoffman's wildest dreams. The device sold in the millions, and variations of the design still sell today. The Bullworker—originally known as the *Tensolator*—consisted of a telescopic spring-loaded tube, with cables attaching both ends. By pushing the tubes together, or pulling the cables apart, an athlete could achieve a strong isometric contraction.

The Bullworker became hugely popular because it was very, very effective. Just like all traditional isometrics, it was highly convenient. An

athlete could train at home, didn't require a gym, and the device could be stored virtually anywhere. In addition, athletes saw impressive results fast with a Bullworker, because the strong spring mechanism allowed them to exploit the loading reflex—even during static holds, their muscles were pushing against something real: *the force of the spring was pushing back*. This application of spring technology was the real genius of the Bullworker. It encouraged harder work, stronger contractions, and quicker gains in strength and size.

FIG.1

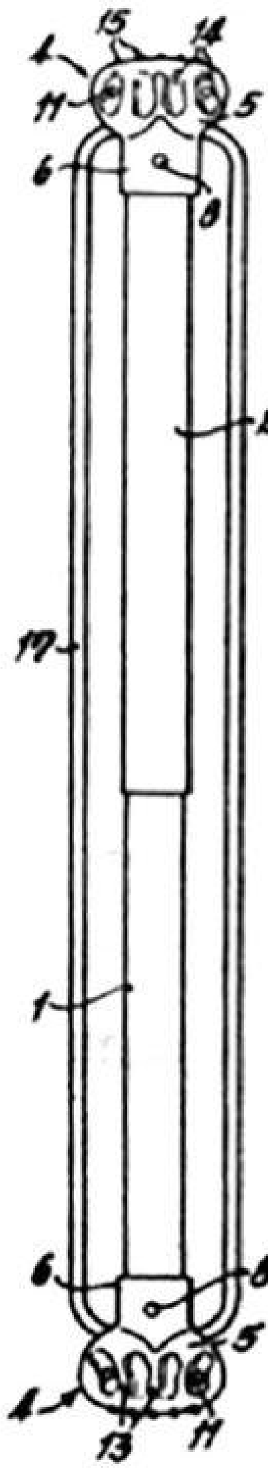


FIG.2

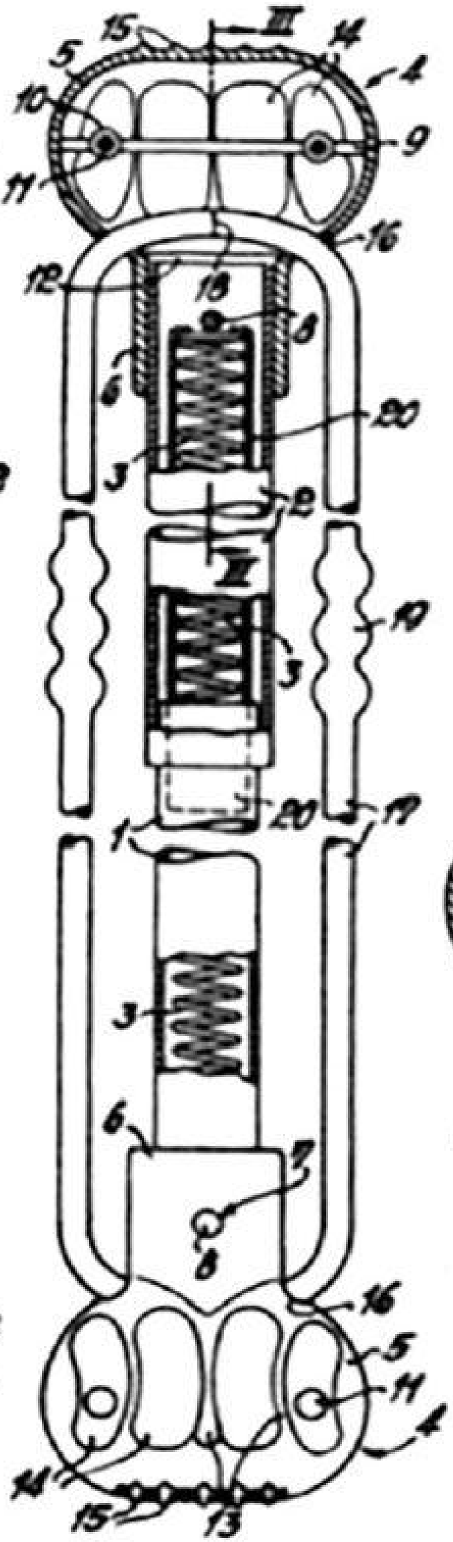


FIG.3

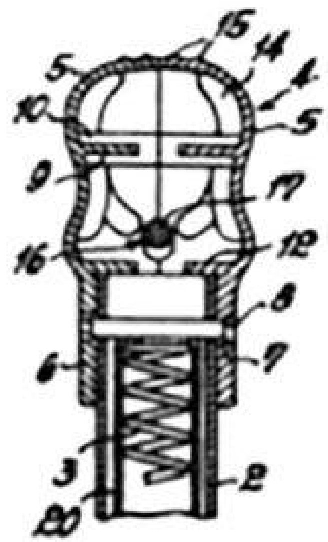
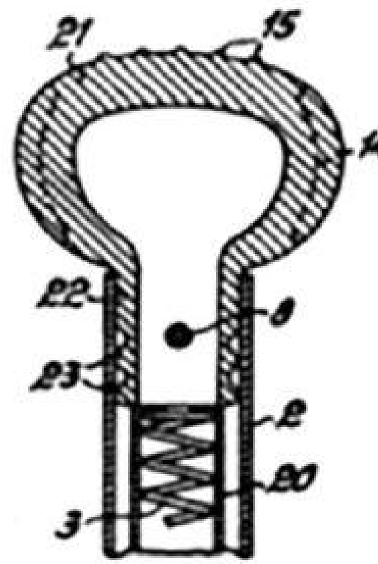


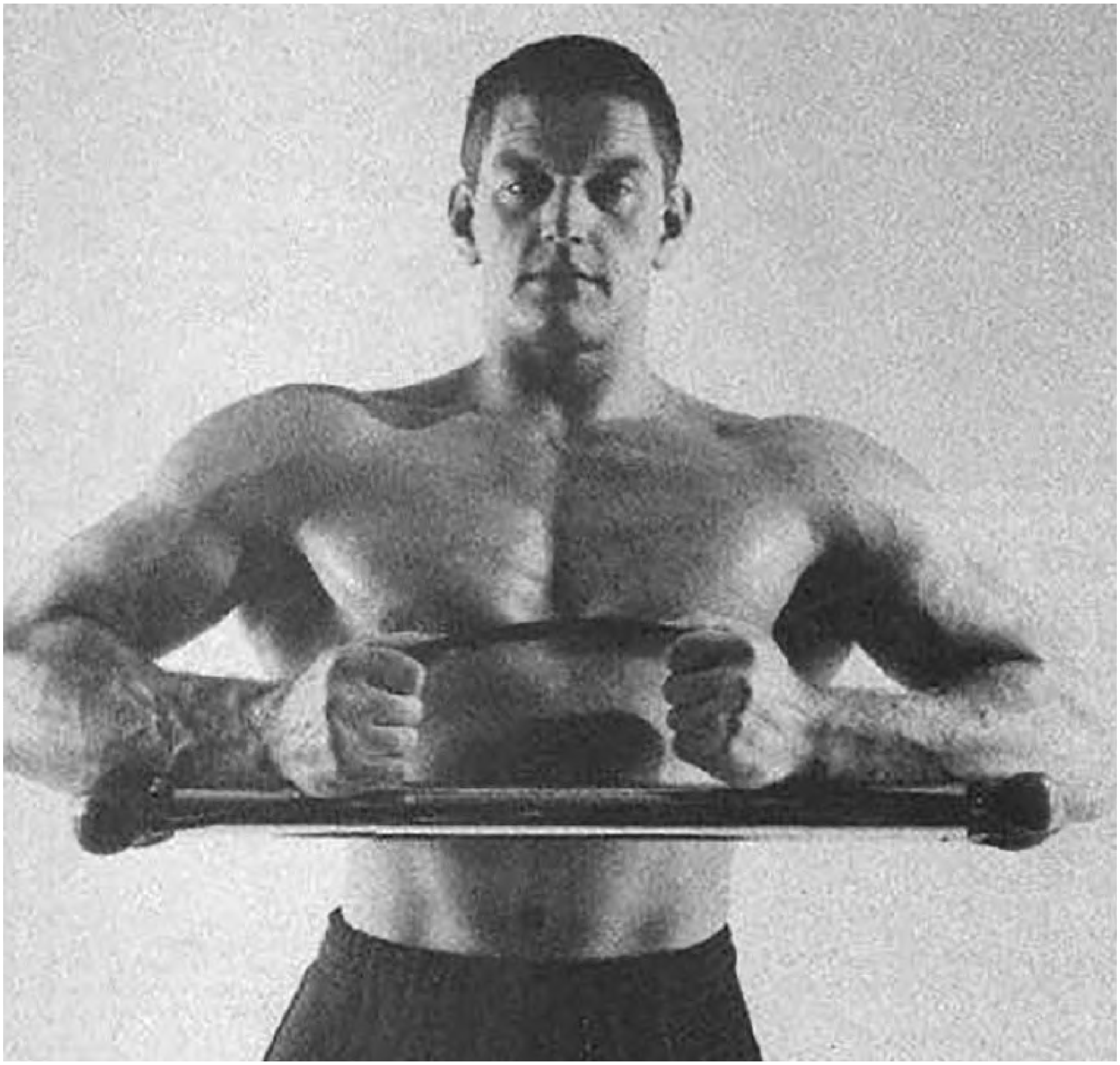
FIG.4



INVENTOR
G. F. Kölbel

PATENT AGENT
Fetherstonhaugh & Co.

But even the huge popularity of the Bullworker began to wane by the 1980s. Why? Several reasons. Although the Bullworker was very useful for some upper-body training, getting a heavy leg or back workout was impossible with the device. Measurability was another issue. Although the device *claimed* to measure the forces an athlete was exerting—via a "power meter" which was nudged as the telescopic pipe was closed—in reality this was misleading. This was because of the physics of *Hooke's law*; as you squeezed the spring, it became exponentially harder to move it any further. These uneven spring-mechanics in the original Bullworker were ideal for generating power in isometric exercises, but unfortunately meant that realistic, *accurate* measurements based on the spring movements were impossible. For these reasons, many coaches and athletes today (perhaps unfairly) view the device as a nothing but a fad.



Dave Prowse—the actor who later played Darth Vader—using a Bullworker.

✗	✓	✓
MEASURABILITY	**LOADING REFLEX**	**CONVENIENCE**

Hopefully now it will be clear why it's been difficult to unite the three qualities of a "perfect" isometric method—convenience, measurability and the loading reflex. Whenever you add one, you seem to take another away.

There is, however, an answer to these problems.

The best solution is to utilize the *convenience* of the classic chain-and-handle isometric equipment developed in the first half of the twentieth century; add the *loading reflex* effect via the spring technology popularized in the 1960s; and combine these with modern, twenty-first century digital electronics to dependably *measure* the athlete's strength levels. Such a hybrid device would permit athletes to perform all manner of isometric back, leg, torso and arm exercises unassisted at home, with the training benefits of "live" loading, and an exacting digital display to time, record and measure training performances with a laser-like level of computer accuracy.

This device is the *Isochain.*

The Isochain ticks all the boxes required for a perfect isometric device. It is convenient to use, provides a realistic loading reflex, and measures the training forces the athlete produces with a bleeding-edge level of precision. As a result, home-trainers and athletes can follow in the traditional footsteps of the strongmen, kung fu masters and bodybuilders who pioneered isometrics training, but with the benefits of modern, digital equipment—and in the knowledge that they are using the most productive and efficient resistance training technology known to modern science.

In the next chapter, we will discuss the design and function of the Isochain in further detail.

The Isochain: chain-and-plate convenience, spring-based loading reflex, and measures forces better than any barbell on earth.

✓	✓	✓
MEASURABILITY	LOADING REFLEX	CONVENIENCE

*See the discussion of cortical inhibition in chapter 5.

Static work is done during isometric muscle contraction. Because no distance is traversed, this is not work in the physical sense; nevertheless, the body shows physiological strain responses to the demand. The performance in this case is measured as the product of force and time.

-Ulmer, *Human Physiology*[1]

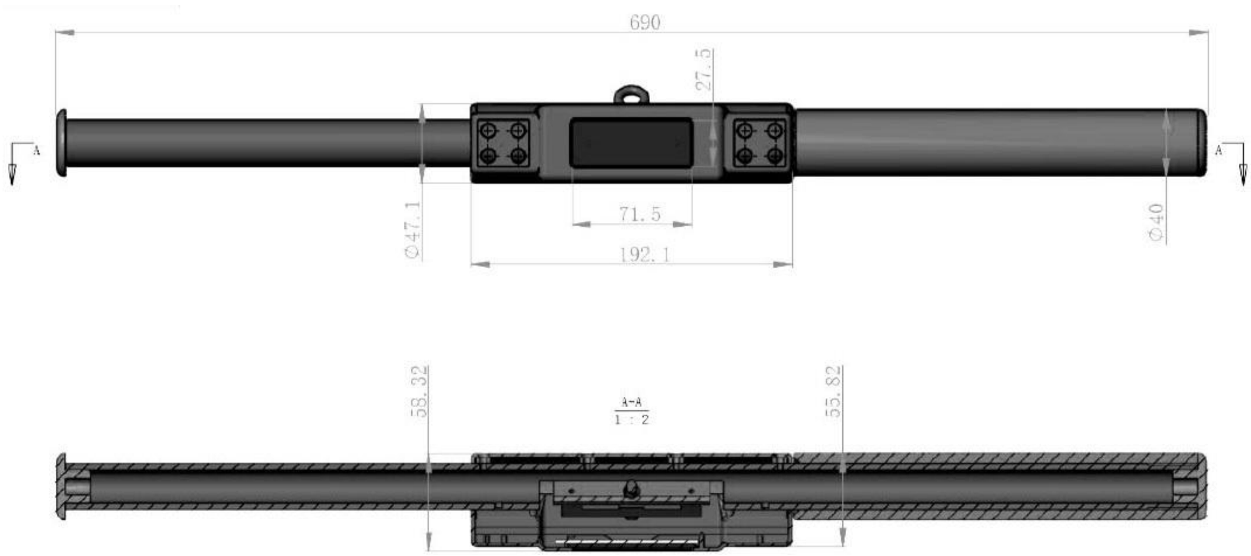
9. The Isochain
Design and Specifications

As mentioned in the previous chapter, the isometric chain-and-bar device is not new. Having evolved from the chain-pulling exercises of the early twentieth century strongmen, and being influenced by the German research and Hoffman's studies, chain-and-bar devices became popular in America and Europe halfway through the last century. The tool was first exploited by Olympic weightlifters, however before too long many different athletes began using similar equipment; martial artists, footballers, bodybuilders, track athletes, and so on.

By the start of the 1960s, chain-and-bar devices had become a veritable exercise craze; no longer confined to serious athletes, now businessmen were using these devices in the office to stay trim between meetings; even housewives were performing identical isometrics between chores (in high-heels, if the photographic evidence is to be believed).[2] *Sports Illustrated* ran a couple of popular articles on the new training sensation sweeping the nation. Joe Weider mass-produced a cheap chain-and-bar-type device for home use around this time, and by all accounts the equipment sold like hot cakes.

The reason for this popularity should be obvious. Firstly, chain-and-bar devices are incredibly convenient compared to their traditional brothers, barbells and dumbbells. The equipment is light, easy to transport, and

requires virtually no space to store or train with. They are also relatively easy to use; since isometrics depends on autoregulation (your body contracts as hard as it can, regulating the levels of force required), there is no guesswork with adding or subtracting weights, etc.



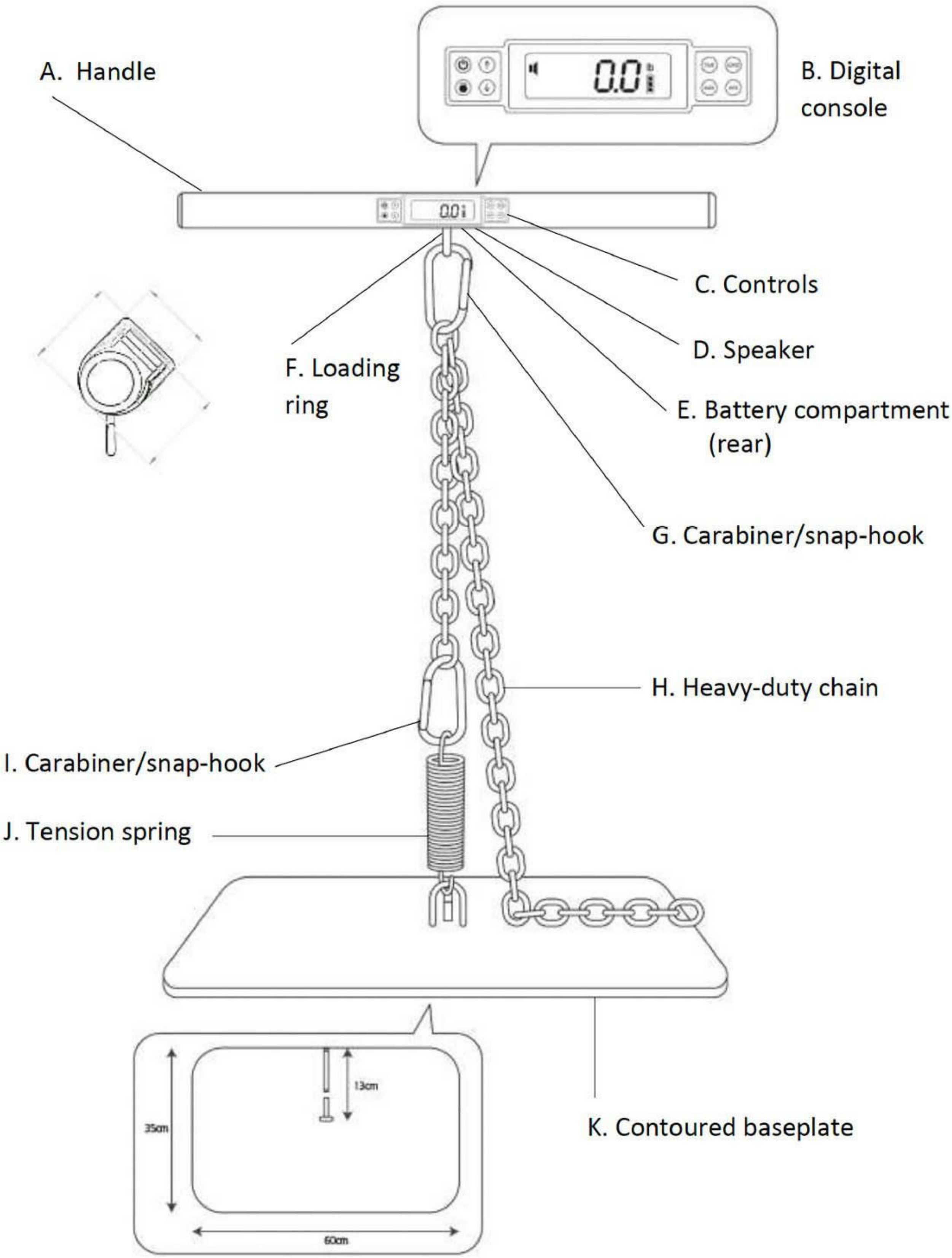
Perhaps the biggest reason these devices took off was the simplest: *they worked.* You only have to use a chain-and-bar device for a few sessions to unequivocally *feel* yourself getting stronger, in a dramatic and unmistakable fashion.

Despite the efficacy of these devices, it should be obvious why their explosive popularity ultimately waned. Even though you can instinctively feel yourself becoming stronger, there is no way to gauge how much force you are using, and how you are progressing. As a result, even dedicated users began to get bored using these old-tech devices. After the initial thrill of new muscle tone wears off, from month-to-month you have no way to quantify your progress, and this eventually kills motivation stone dead.

The Isochain has been designed by a team of engineers to overcome this problem. Not only is there a digitally accurate force display in the handle of the device, but the tool also includes audio feedback on whether you are meeting your pre-selected Target Load. But the inclusion of this measurement tech is by no means the only innovation present in the device. The Isochain includes many more features, including multiple training

“modes”, digital memory, and components creatively designed to maximize training gains.

Over the remainder of this chapter, we’ll run through the basic design and fundamental features of this patented game-changing strength technology.


A. Handle
B. Digital console
0.0
C. Controls
D. Speaker
E. Battery compartment (rear)
F. Loading ring
G. Carabiner/snap-hook
H. Heavy-duty chain
I. Carabiner/snap-hook
J. Tension spring
K. Contoured baseplate
13cm
35cm
60cm

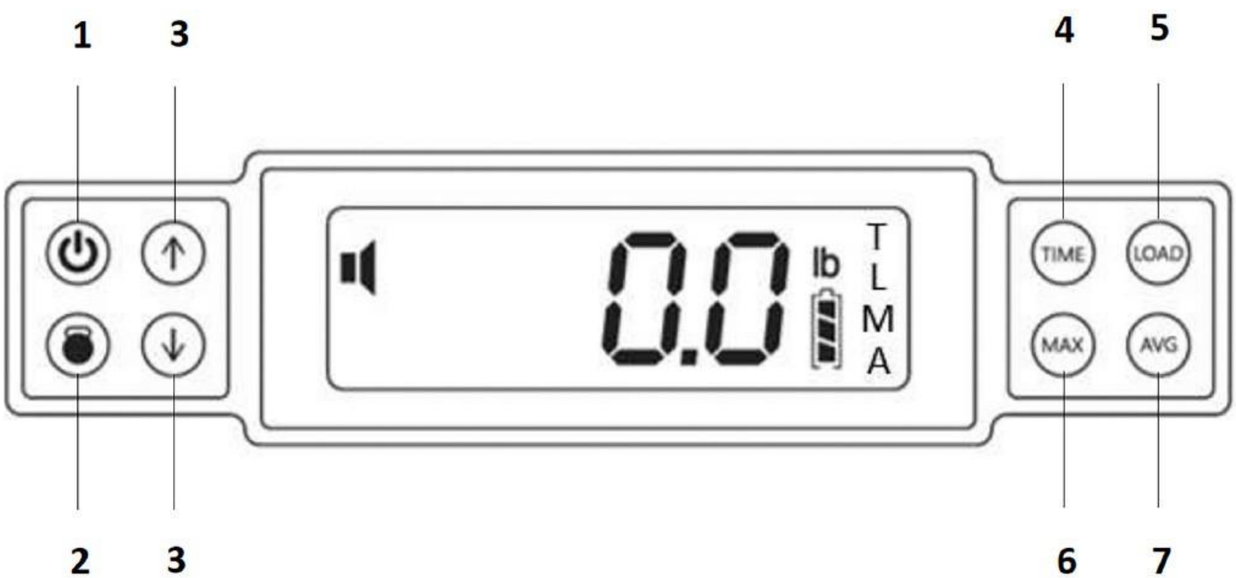
The handle is fixed at a 45-degree angle to the loading ring, rather than being flat on top; this allows athletes to clearly see the readout, even at eye-level.

ISOCHAIN COMPONENTS:

A. **HANDLE.** The handle comprises a heavy-duty steel core, covered with a non-slip military-grade compound rubber coating, for high tensile strength and long life. The handle (along with all other components) has been rigorously tested to accommodate over a thousand pounds of force.

B. **DIGITAL CONSOLE.** The console consists of a superior backlit LCD for clearer viewing in all kinds of light.

C. **CONTROLS.** The controls are simple, responsive and intuitively designed. Controls comprise:



1. **Power.** On/off

2. **Weight Toggle.** Kg or lbs; holding Weight Toggle allows you to access the Volume Control, using the up/down keys

3. **Up/Down.** To select custom Target Load, Target Time or change volume

4. **Timed Mode.** Default time is 6-seconds; holding Timed Mode allows user to set a custom Target Time

5. **Load Mode.** Allows user to set a Target Load

6. **Max Mode.** Shows maximum force (in weight) achieved during a set

7. **Average Mode.** Shows average force (in weight) achieved during a set

D. **SPEAKER.** Speaker is built-into the console, and is volume-controlled.

E. **BATTERY COMPARTMENT.** Batteries are readily available domestic AA-type; easy to access and change.

F. **LOADING RING.** Heavy-duty steel O-ring on underside of handle connects to cutting-edge strain gauge sensor technology inside the handle.

G. **CARABINER.** Black steel spring snap-hooks make for a safe and rapid means to change the chain-length.

H. **HEAVY DUTY CHAIN.** The black steel 8mm chain is strengthened to resist superhuman levels of force, and electroplated for maximum protection. At 85 inches, the extended device reaches over seven-and-a-half feet, accommodating overhead work for even the tallest athlete.

I. **CARABINER.** A second snap-hook secures the lower point of the chain to the spring.

J. **TENSION SPRING.** Large steel tension spring provides 85 mm elongation against 450 kg of force, allowing even the world's strongest

athletes to use the Isochain.

K. **BASEPLATE.** The super-sturdy steel baseplate measures 35 cm by 60 cm has a checker plate texture for added grip, coated and plated for durability, and is contoured for safety.

HIDDEN FUNCTIONS:

- **DIGITAL MEMORY.** Console retains previously set Target Time and Target Load variables until they are reset—even if the device is turned off.

- **AUTOMATIC TARE.** The CPU inside the console is calibrated to recognize the weight of the chain, and ignore it during any readouts—the force shown on the console is the force generated by the athlete.

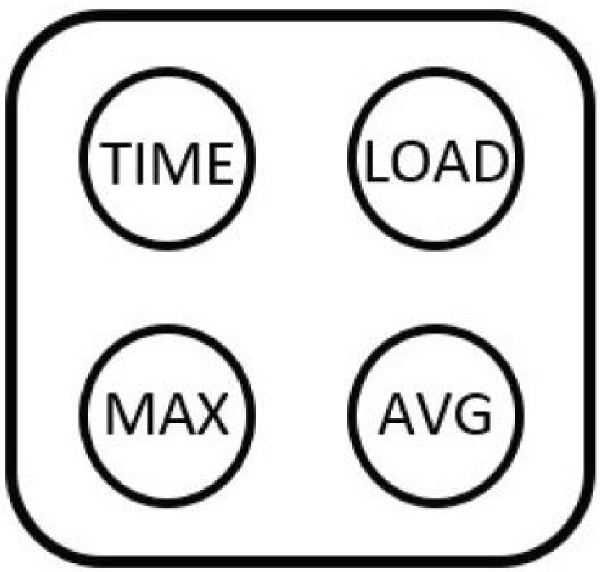
Functional isometric training can enhance maximal dynamic strength.

-*Applied Anatomy and Biomechanics in Sport*[1]

10. The Isochain

The 5 Training Modes

The Isochain has been designed with 5 training modes included; a "default" training mode, plus four major modes:



Default: FEEDBACK MODE

Mode 1: TIMED MODE

Mode 2: LOAD MODE

Mode 3: MAX MODE

Mode 4: AVERAGE MODE

These training modes are at the heart of the Isochain. They have been ergonomically designed to allow athletes to optimize their training at the touch of a button—with no overly complex technological knowledge required. Each mode represents a different kind of training style, which can be utilized depending on the athlete's goals: *Timed Mode* is best for overall strength and fitness; *Load Mode* mimics traditional resistance training methods; *Max Mode* works well for strength testing; and *Average Mode* is ideal for prolonged Time-Under-Tension holds for bodybuilding or endurance work (although it can be manipulated to make bespoke programs for a variety of purposes). This chapter will teach you everything you need to know about the modes—how to use them, what they're for, and what benefits you can expect.

DEFAULT: FEEDBACK MODE

FUNCTION: *The display shows the fluctuating force level being applied against the Isochain handle, in real time.*

PURPOSE: *Feedback Mode lets athletes know exactly how much force they are exerting, at any given time.*

The force level (given as weight) displayed on the digital console continually fluctuates, increasing or decreasing as the bar is pushed or pulled, accurately displaying the force levels being applied through the handle.

OPERATING INSTRUCTIONS

- Feedback Mode is the default mode of the display unit. It's the mode which automatically functions when you turn the unit on.
- When no letters (T, L, M, A) are present on the display, the unit is in Feedback Mode.
- To end Feedback Mode, simply select a different mode.

When no letters (representing the main four modes) are present on the console, the device is in Feedback Mode.

APPLICATIONS

- Warming up
- Technical calibration
- Drill experimentation and testing

Feedback Mode is useful for exploring the performance potential of different grips, stances, etc.

Feedback Mode is the default mode which initiates when the device is turned on. Because Feedback Mode allows the Isochain user to see the forces they are generating with a technique—with a high level of accuracy and in real time—it can be useful for performing warm-up holds prior to serious training. Feedback Mode is also excellent for 'fine tuning' (or calibrating) the technical aspects of any technique. With a barbell it is virtually impossible to tell if a slight stance variation improves strength by a few percent at any given position, but this mode provides this information clearly and rapidly. Feedback Mode is also a great tool for experimenting with different drills—do different nuances such as grip-styles or foot placement affect performance? Feedback Mode will tell you.

MODE 1: TIMED MODE

FUNCTION: *The console displays the fluctuating force level being applied against the Isochain handle in real time, but bleeps when a Target Load is attained; if the Target Load is maintained (or exceeded), the device bleeps once per second; the final bleep is extended (two seconds) to tell the athlete that the set is completed.*

PURPOSE: *Timed Mode lets athletes know when they have held their Target Load for their Target Time.*

OPERATING INSTRUCTIONS

- Press 'TIME' key to initiate Timed Mode. The letter "T" will appear in the sidebar.

- The default Target Time is 6-seconds.

- To set a custom Target Time, hold the 'TIME' key for two seconds, and enter a time in seconds using the up/down keys: anywhere from 2 - 999 seconds. Once the Target Time is entered, the display will flash briefly, then return to zero.

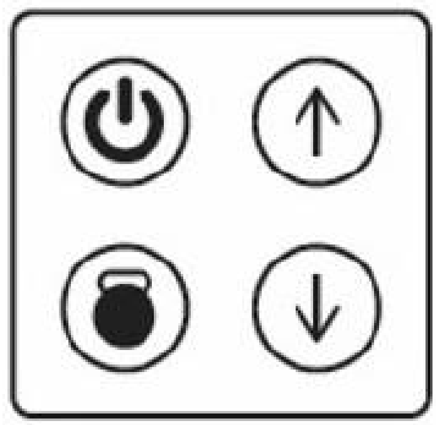
- Perform a repetition. The display will show forces in real time. Once the Target Load is reached, the unit will bleep. (To discover how to set the Target Load, see LOAD MODE on page 102 to 103.)

- Provided the Target Load is maintained (or exceeded), the unit bleeps once per second. The final bleep is extended (two seconds), to inform the user that the timed "rep" has been successfully completed.

- The Isochain remembers the custom Target Time and Target

Load until it is reset, meaning the athlete can keep performing reps at that level.

- Choosing a different mode will reset Timed Mode.



UP/DOWN KEYS allow user to set Target Time

During a rep, the console displays any forces (as weight) that the athlete is exerting—but the unit also times the athlete.

When in Timed Mode, the console sidebar displays the letter 'T'.

APPLICATIONS

- Scientifically established as the superior method to develop strength with isometrics

- Provides feedback to help athletes meet predetermined goals

- Timed holds should form the bulk of most athlete’s training

Timed Mode tells athletes if they are hitting their targets, even if they can't see the console—or a clock.

Isometric workload is measured as force over time. Traditionally, it's easy to measure the time of your holds using a clock, or by counting; but measuring force levels is more difficult. Timed Mode removes the guesswork and measures *both* variables with digital accuracy. For most athletes,Timed Mode is useful if you don't wish to count the beeps (i.e., the seconds) in Load Mode. All you need to do is enter a Target Load—say 100lbs—and a Target Time—say, 20 seconds—and train. When you hit your goal weight, the unit bleeps; provided you maintain (or exceed) that target weight, the unit continues to bleep, one bleep per second. The final bleep is extended to two seconds—when that bleep finishes, the user knows that the timed "rep" is over. Don't want to select a Target Time? No problem. The majority of scientific research into isometrics is in agreement that timed holds (specifically 6-second holds—see page 271) are the fastest and most efficient way to build huge strength. This is the default Target Time programmed into the Isochain.

MODE 2: LOAD MODE

FUNCTION: *The console displays the fluctuating force level being applied against the Isochain handle in real time, but bleeps when a pre-determined Target Load is attained.*

PURPOSE: *Load Mode lets athletes know when they have reached the weight they wanted to achieve during the repetition.*

The hidden speaker inside the console bleeps when the Target Load is met.

During a rep, the console displays any forces (as weight) that the athlete is exerting—but as soon as it reaches a weight the user has selected, the unit bleeps.

When in Load Mode, the console sidebar displays the letter 'L'.

OPERATING INSTRUCTIONS

- Press 'LOAD' key to initiate Load Mode.
- The symbol 'L' will appear on the sidebar, and the readout will display as zero.
- To set a Target Load, enter any desired weight into the

display using the up/down keys. Once the load is entered, the display will flash briefly, then return to zero.

- Perform a repetition. The display will show forces in real time. Once the Target Load level is reach, the unit will bleep once per second.

- Select another mode to reset Load Mode.

APPLICATIONS

- Bespoke timed holds at a pre-selected load

- Traditional set-and-rep methods

- Protocols where reps are based on pure strength (force levels) rather than strength-over-time

Load Mode mimics traditional resistance training with digital accuracy—you choose exactly how much is "on the bar".

Load Mode allows you to enter whatever Target Load you wish, as weight (kgs or lbs). Once you perform a drill and reach that weight, the device will bleep, once per second. Like Timed Mode, this means that you can know you've hit your goal weight, even if you aren't looking at the console—which is usually inconvenient during standard drills. Load Mode is therefore very flexible. Once you have set a goal weight (the Target Load), you can either time how long your holds are by using a clock or timer, or by simply counting the bleeps (one per second). Load Mode can also be performed with "sets and reps" just like classical training with barbells and dumbbells. To do this with any exercise, just pull or push the bar until the goal weight is reached and the unit bleeps once (one rep); relax and immediately repeat for a desired number of reps (one set). Then rest for a short while (30s – 1 minute) and repeat the process for as many sets as required. This method can work well for bodybuilders and athletes who psychologically enjoy or respond well to the rhythms and pacing of traditional in-gym methods.

MODE 3: MAX MODE

FUNCTION: *The display shows the highest force level that was applied against the Isochain handle over the course of a repetition.*

PURPOSE: *Max Mode lets athletes know the highest level of force they are able to exert during any drill.*

The digital console displays the highest force level (given as weight) that has been applied through the handle since the display was last at zero. This maximum force level remains on the display until the athlete changes mode.

OPERATING INSTRUCTIONS

- Perform an isometric hold with the Isochain. (The device can be in any mode: Feedback, Timed, or Load).
- Following the set, press the MAX key. The symbol 'M' will appear in the sidebar, and the console will display the highest force level achieved during the effort.
- The maximum force level is displayed until the console is reset. To reset Max Mode, change to another mode.

When in Max Mode, the console sidebar displays the letter ‘M’.

APPLICATIONS

- Self-testing for Personal
- Bests on any given drill
- Establishing 1-rep maximums in any drill (for programs where % of 1-rep maxes are required)
- “Singles” training
- Multi-athlete training contests

Because this mode gauges maximum strength, it allows athletes to train competitively.

Even when you are using Timed Mode or Load Mode, there are circumstances where it's useful or interesting for a coach or athlete to know exactly what the *very highest* level of force they can apply is on any given drill, regardless of the time factor. This is where the Max Mode shines—after a rep, simply push the MAX button. It's both useful and motivating for athletes to be able to test their Personal Bests now and again to gauge progress and to know what their upper limits are. This mode also allows fellow athletes to compete against one another in strength tests (these can be fun or fiercely competitive, depending on who's involved!). In addition, some training methods call for an athlete to express a certain percentage of their strength as part of the protocol (see page 300 for an example). To be able to use these methods, the athlete needs to know their strength limit in order to be able to calculate those percentages.

MODE 4: AVERAGE MODE

FUNCTION: *The display shows the average force used over the length of the last repetition.*

PURPOSE: *Average Mode lets athletes know the average level of force they exerted during any drill.*

User can toggle between AVG and MAX Modes to obtain both data-sets.

The digital console displays the average force level (given as weight) that has been applied through the handle since the display was last at zero. This average force level remains on the display until the athlete changes mode.

When in Average Mode, the console sidebar displays the letter 'A'.

OPERATING INSTRUCTIONS

- Perform an isometric hold with the Isochain. (The device can be in any mode: Feedback, Timed, or Load).

- Following the set, press the AVG key. The symbol ‘A’ will appear in the sidebar, and the console will display the average force level achieved during the effort.
- The average force level is displayed until the console is reset. To reset Average Mode, change to another mode.

APPLICATIONS

- Spontaneous or instinctive sets
- TUT (Time-Under-Tension) work; e.g., bodybuilding techniques
- Training to “failure”
- Endurance training

No need to look at a clock. With the addition of Timed Mode, Average Mode allows you to personalize your rep periods to any length. Just set the Target Load to an arbitrary low threshold.

Most isometric training methods call for a Target Load to be utilized. But what if you don't wish to limit yourself to a fixed goal weight? What if you just want to work as hard as you like, for a given period of time? Well, one way you can do this and still measure your workload is by knowing the *average* force level you achieved, over the time you trained. This is where Average Mode shines. Following an isometric drill, just press the AVG key, and the average force level for the most recent drill will be mathematically calculated and displayed on the console. This is useful if you want to perform longer isometric holds, where strength may decline below a Target Load. It's ideal for isometric bodybuilding workouts (see page 310), which typically require longer Time-Under-Tension than other methods (TUT). You can also use this mode to explore extended isometric holds; one minute, two minutes, five minutes, etc. This is not only an excellent way of building conditioning and cardiovascular capacity; it will also work perfectly for athletes who require high levels of isometric endurance for their discipline (e.g., classical martial artists, speed skaters, etc).

PART III

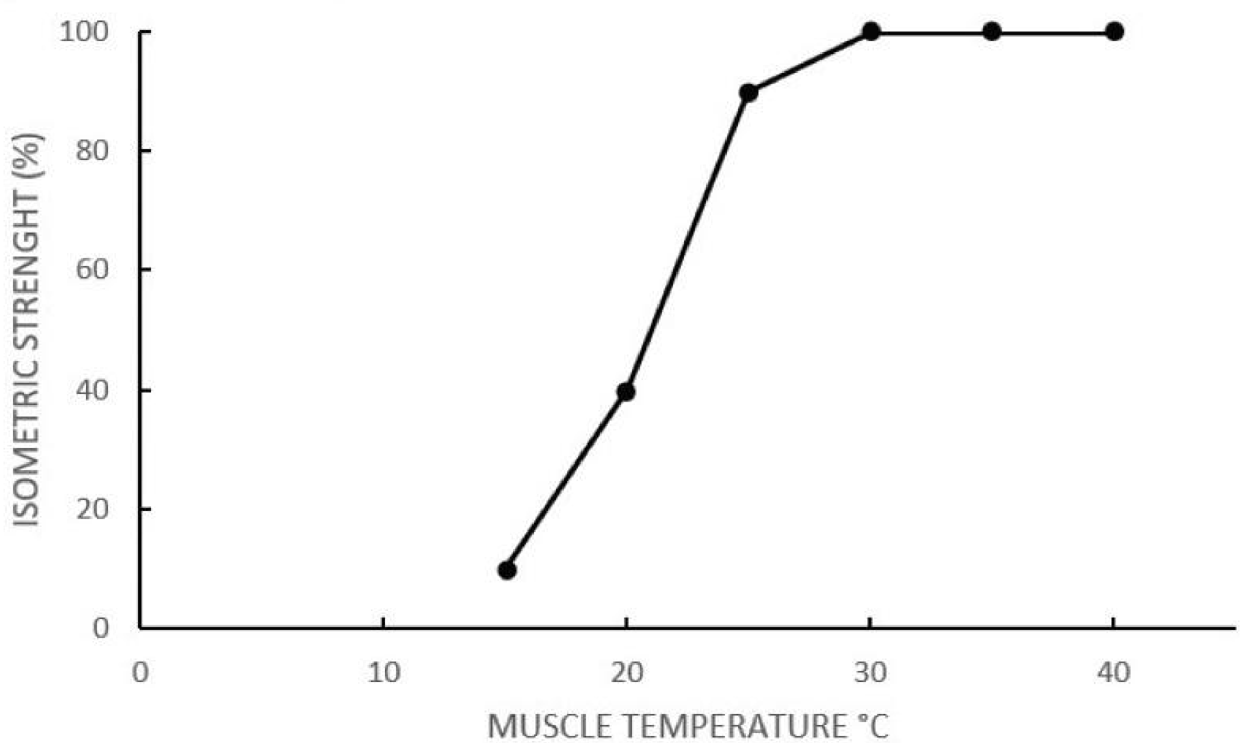
ISOMETRICS: THE DRILLS

A number of inherent factors will alter isometric strength. One such factor is muscle temperature.

-Petrofsky, *The Physiology of Static Exercise*[1]

11. Warming Up
The Binary Method

It has been scientifically established that approaching isometrics with warm "shell tissues" (i.e., the muscular system and soft tissues) results in greater strength and efficiency (see page 267). It also reduces the likelihood of injury during high-intensity training. For these reasons it is advisable for athletes to perform a general warm-up prior to an isometrics session. There are many different methods we can use for this purpose. If you already have an approach you favor, by all means apply it. If not, in this chapter we will be presenting a logical, efficient protocol that requires zero equipment, and which most athletes can apply with great success and in a very compact time frame.



Muscles that are warm are capable of higher peak contractions.[2]

Binary warm-ups

"Binary" warm-ups are so-named because they feature two basic types of dynamic, muscular drills; *upper-body* drills and *lower-body* drills. To utilize this method, the athlete simply picks five lower-body drills and five upper-body drills, and alternates them one after the other for 30 seconds each. After all ten drills have been completed (five minutes, total) every muscle in the body is warm, shell temperature has increased, and the athlete is ready to perform a productive session of heavy isometrics.

BINARY WARM-UP PROTOCOL

- Pick 5 lower-body drills (page 114 to 115)
- Pick 5 upper-body drills (page 116 to 117)
- Alternate the upper and lower-body drills

- Perform all 10 drills back-to-back, without a rest
- Don’t count reps, just perform each drill for 30 seconds

TOTAL TIME: 5 minutes

The lower-upper body drills are illustrated after the following page. A sample warm-up can be found on page 118 to 119.

“VIRGIN” SORENESS AND THE BREAKTHROUGH PHASE

A warm-up is essentially a pre-conditioning session prior to each workout. Just as a sensible athlete ensures that he or she is prepared for each training session, so they should take steps to make sure that they are ready to begin isometric training *altogether*—particularly if they are new to training or isometrics.

Due to the lack of eccentric movement, isometric strength training causes less soreness than other forms of exercise.[3] This doesn’t mean that isometric training cannot produce soreness or damage—it can still cause post-training delayed onset muscle soreness (DOMS), like any other form of training.[4] This is the kind of aching and irritation in the muscles the morning after, or in the days following, hard training.

This soreness is typically seen in beginners, deconditioned athletes, and those new to isometrics or heavy lifting.[5] It can also occur when isometric drills are performed with the muscles in a stretched position, or when volume is excessive.[6] The reason why is simple: isometric training permits the use of much higher loads than conventional training methods.[7] This means that isometrics is highly stimulating to the muscular system and soft tissues, but it also causes

stress to those tissues. If your muscles aren't conditioned to accommodate high forces, isometrics can make you very sore and stiff at first; if you have lingering injuries, these may also feel tender or inflamed after the first few training sessions. You may even think: *isometrics hurts—it's not for me.*

Hold fire. The good news is that after your soft tissues have passed through a breakthrough phase—lasting typically 2-4 weeks—this kind of "virgin" soreness begins to ease off, and finally disappears almost completely. After this point, not only will isometrics (correctly performed) *not* cause pain to the joints and old injuries, it will actually produce immediate and significant pain relief, of an order superior to some medications.[8]

Not only do isometrics relieve pain, studies have shown that isometrics also have a remarkable "protective effect" against muscle damage caused by other types of exercise;[9] meaning that if you perform isometrics regularly, they will prevent you feeling sore after conventional training, including explosive or heavy exercises.[10]

The take-home: to avoid excess soreness, beginners should build into their training gradually over the first 2-4 weeks. Keep volume low (> 6 sets per session at first), keep intensity moderate (> 50% of max, initially), and avoid training the muscles at any angle where they are stretched. Gradually add more sets and intensity after this period.

LOWER BODY

SPOT JOGGING

PERFORMANCE: Standing on the spot, “run” by lifting the knees up and down. Move the arms also.

OPTIONS: To make the drill easier, lift the knees less; to make it harder, lift the knees as high as possible on each stroke.

QUARTER SQUATS

PERFORMANCE: Bend at the knees and hips, dipping quarter of the way into a full squat. Keep the feet flat on the floor.

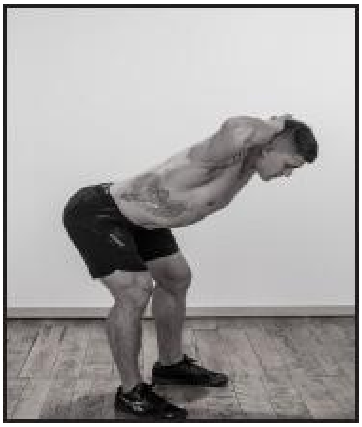
OPTIONS: To make the drill easier, squat with less depth; to make it harder, squat down lower.

HOP JUMPS

PERFORMANCE: Dip down slightly, before hopping up into the air. Rebound and repeat immediately upon landing.

OPTIONS: To make the drill easier, rest between repetitions; to make it harder, dip down lower and jump higher.

GOOD MORNINGS



PERFORMANCE: With hands behind your head, bow down before standing upright again. Keep a flat back and bent knees.

OPTIONS: To make the drill easier, bow to a lesser angle; to make it harder, bow deeper than horizontal.

STAR JUMPS

PERFORMANCE: Leap up, punching the arms and legs out laterally, before landing. Rebound and repeat upon landing.

OPTIONS: To make the drill easier, reduce jump height and limb movement; to make it harder, increase both.

LEG KICKS

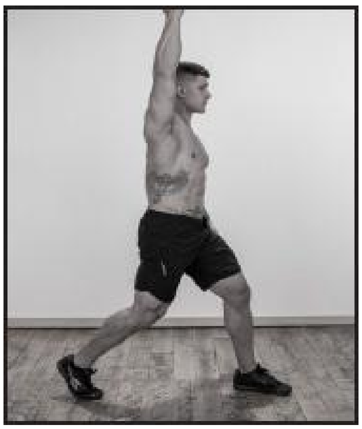
PERFORMANCE: Swing one leg up vigorously to horizontal, keeping a kink at the knee. Repeat with the other leg.

OPTIONS: To make the drill easier, swing the leg lower; to make it harder, kick higher and/or touch the hands to the feet.

LATERAL SKIPS

PERFORMANCE: From a ready stance, leap to the side, passing one foot behind you, before reversing the movement.

OPTIONS: To make the drill easier, use a higher stance/smaller jump; to make it harder, use a deeper stance/bigger jump.



SKI STRIDES

PERFORMANCE: Pop one leg and the opposite arm forward into a split stance, before immediately reversing the motion.

OPTIONS: To make the drill easier, use a higher stance/smaller jump; to make it harder, use a deeper stance/bigger jump.

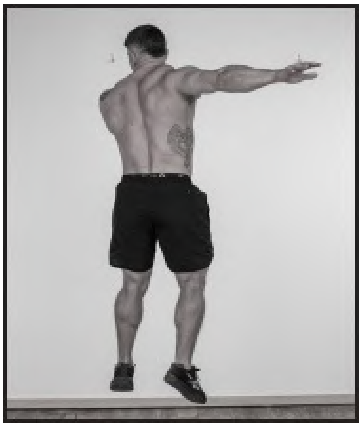
ELBOW-KNEES

PERFORMANCE: Explosively raise your knee and touch it to the opposite elbow; repeat on the opposite side.

OPTIONS: To make the drill easier, don't touch the elbows to knees; to make it harder, lift the knee higher than the elbow.

SPIN HOPS

PERFORMANCE: Dip down and hop up, spinning 180 degrees, and landing on the same spot. Repeat in opposite direction.



OPTIONS: To make the drill easier, spin only 90 degrees; to make it harder, spin 360 degrees

UPPER BODY

ARM CIRCLES

PERFORMANCE: With the arms straight, swing the upper-limbs in circles, alternating forward and backwards motions.

OPTIONS: To make the drill easier, make smaller circles or bend the arms; to make it harder, make larger circles..

HORIZONTAL PUNCHING

PERFORMANCE: With a symmetrical or combat stance, rapidly punch the space in front of you, alternating arms.

OPTIONS: To make the drill easier, use shorter strikes; to make it harder, use longer strikes.

WALL PRESSES

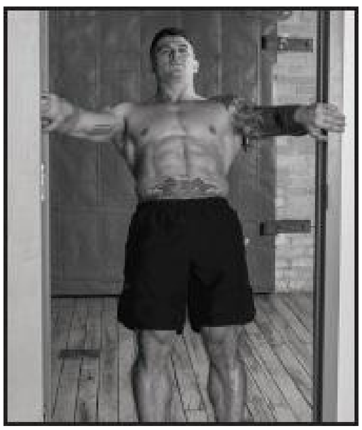
PERFORMANCE: With your hands on a sturdy wall, bend at the shoulders and elbows, before straightening them again.

OPTIONS: To make the drill easier, use a shorter ROM or stand closer to the wall; to make it harder, stand further away.

FRONT-TO-BACK CLAPS

PERFORMANCE: Clap your hands in front of you, before swinging them to clap behind you. Immediately repeat.

OPTIONS: To make the drill easier, don't force the hands to meet behind you; to make it harder, keep the arms straight.



DOORWAY ROWS

PERFORMANCE: Grip the sides of a sturdy doorway and lower yourself away from it, before pulling yourself back.

OPTIONS: To make the drill easier, stand further from the doorway; to make it harder, stand closer.

SIDE BENDS

PERFORMANCE: With the hands behind the neck, smoothly bend the torso to either side. Keep a bend in the knees.

OPTIONS: To make the drill easier, keep the hands by the sides; to make it harder, straighten the arms overhead.

VERTICAL PUNCHING

PERFORMANCE: With a symmetrical stance, rapidly punch the space directly above you, alternating arms.

OPTIONS: To make the drill easier, use shorter strikes; to make it harder, use longer strikes.

TRUNK SPINS

PERFORMANCE: With a wide stance, bend over at the waist and rotate the torso back-and-forth. Keep the arms out.

OPTIONS: To make the drill easier, bend the arms; to make it harder, touch the hands to their opposite feet on each rep.

ARM SWINGS

PERFORMANCE: Swing your straight arms behind your body, then rebound them over your head. Immediately repeat.

OPTIONS: To make the drill easier, reduce the range-of-motion; to make it harder, dip down when the arms are behind you.

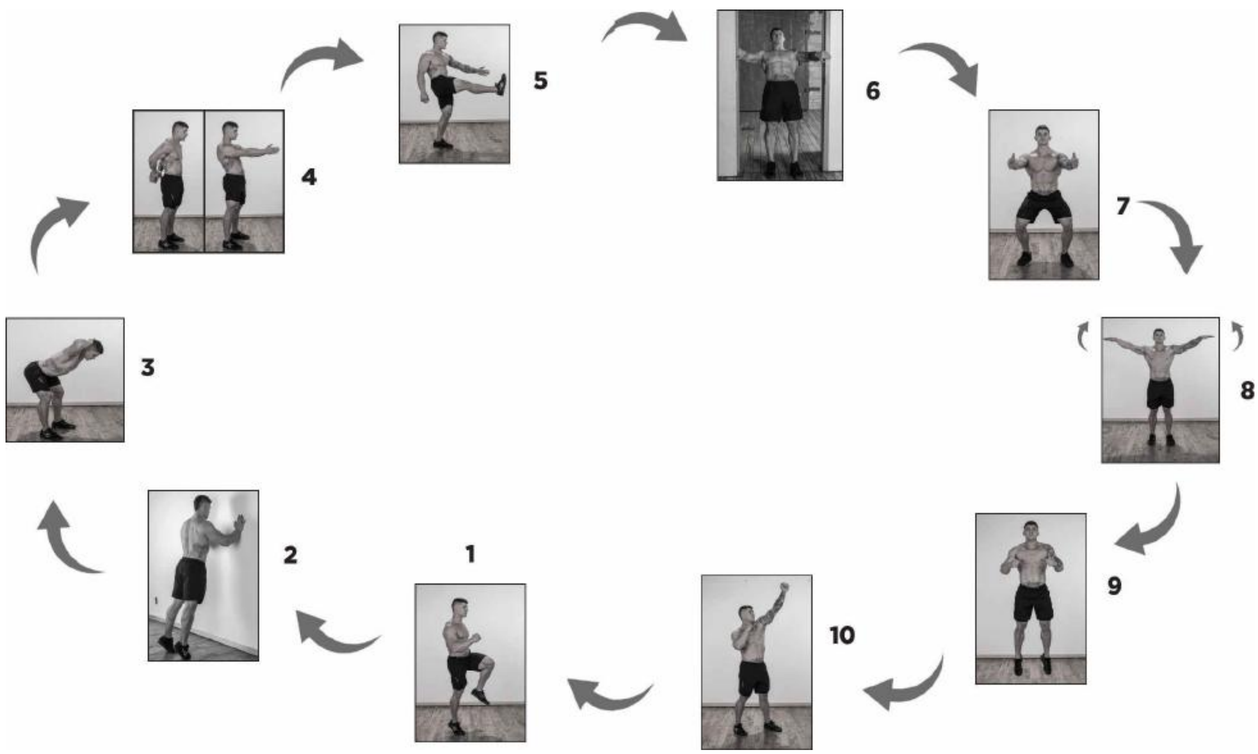
MIDBACK TWISTS

PERFORMANCE: With the feet around shoulder-width, place your hands on your hips and rotate left and right.

OPTIONS: To make the drill easier, use a shorter range-of-motion; to make it harder, hold the arms out straight.

SAMPLE WARM-UP

1.	Spot running	30 seconds
2.	Wall presses	30 seconds
3.	Good mornings	30 seconds
4.	Arm swings	30 seconds
5.	Leg kicks	30 seconds
6.	Doorway rows	30 seconds
7.	Quarter squats	30 seconds
8.	Arm circles	30 seconds
9.	Hop jumps	30 seconds
10.	Vertical punching	30 seconds
TOTAL TIME:		***5 minutes***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10

WARM-UPS: TACTICS AND HACKS

- The lower-body drills are generally more demanding than the upper-body ones, so to get your heart rate up quickly, begin with a lower-body drill.

- Find a level of activity that you can feel warming up the muscles you are working, but don't push too hard or go anywhere near muscle failure—or your warm-up may negatively affect your isometric performance. Likewise, this warm-up provides cardiovascular benefits, but it's not meant to be hard cardio—you shouldn't be huffing and puffing when you finish.

- Your general warm-up should leave you feeling energized and ready to do more. If you find the exercises given too hard, you can modify them to make them easier. (Some suggestions are given in the *Options* section of the descriptions.)

- *Convenience* is a key tactic in helping athletes consistently perform warm-ups. They should be kept simple. Go by the clock, rather than counting reps, and don't bother recording details of your warm-up unless you need to. Just get it done!

- If the five-minute warm-up template seems too easy for you, don't add extra time or drills; simply perform your drills *faster*. A lesser-conditioned athlete may want to take things slowly and perform only around 6 reps every thirty seconds; an advanced athlete going at high speed might perform 30 reps or more in this time.

- When designing a warm-up, try not to overlap techniques; for example, *trunk spins* and *midback twists* (page 117) both work similar muscles, so there's no need to perform both in the same warm-up.

- The drills in this chapter require zero equipment—meaning they can

be done anywhere. There are potentially *hundreds* of great warm-up exercises if you begin adding in equipment (dumbbells, resistance bands, etc).

- Likewise, all of these drills are performed standing on your feet—this means they are low-hassle and there's no excuse not to perform them. However, if you want to explore and include floor drills, there are plenty to choose from (squat thrusts, sit-ups, etc).

- This chapter is only designed to represent a template: feel free to explore other methods and techniques and incorporate them into your warm-ups.

- As with any training protocol, following the same warm-up over a prolonged period will result in staleness—no matter how effective it is. Change your warm-up techniques every month or two at the most. Get creative.

- After your *general* warm-up you should utilize *specific* isometric warm-ups (see page 294) before giving 100% effort on your Isochain drills. These are easy to do, and take less than a minute per drill.

…even if you aren't interested in using isos (isometrics) in your own program, learn how to do them so that you can teach others somewhere down the line. In my mind, it's the ultimate strength exercise and it's in danger of being lost. That can't be allowed to happen.

-Bill Starr, *The Ultimate Strength Exercise*[1]

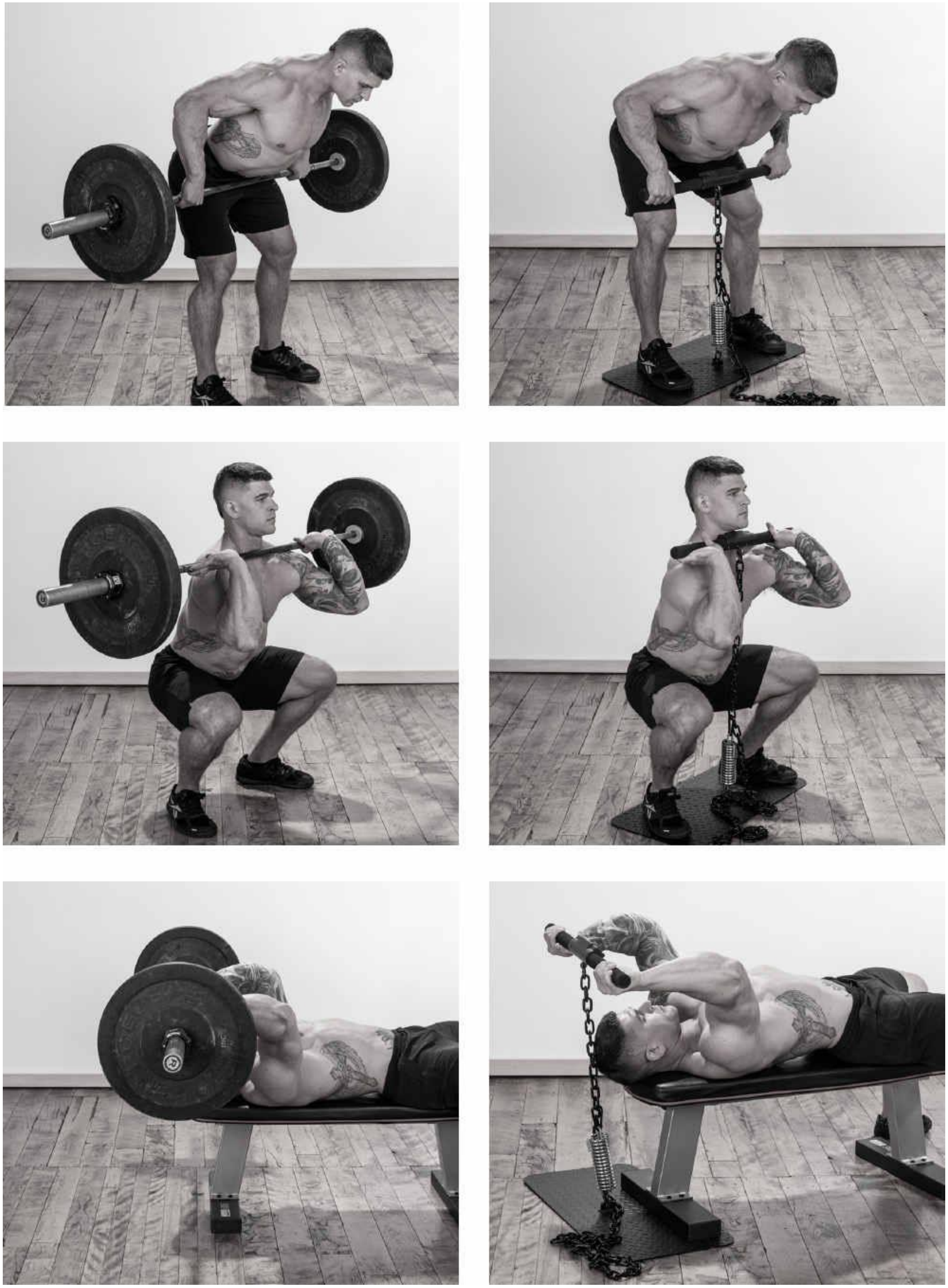
12. Major Isochain Drills
And the Reasons to Use Them

In the previous chapter you learned the best cutting-edge methods to use the Isochain—and isometrics in general—to achieve your goals. Now that you know the general methods, you need to know the individual techniques: *the drills*.

This chapter is a black-belt level course on Isochain exercise. It is based around 38 of the most useful drills anyone can perform using the device. But these 38 only represent the basics. Counting different positions, technical variations and advanced techniques, over 70 drills are outlined in this chapter. But even that doesn't exhaust the armory of Isochain training; as you begin to work out and experiment yourself, you'll soon discover that there are even more techniques out there to be discovered. The Isochain makes them all viable.

It should come as no surprise that the Isochain is so versatile. After all, it simply represents *a point of vertical resistance*. As such, it is really no different from its dynamic counterpart, the barbell; anything you can do with a moving barbell, you can do isometrically with an Isochain. No coach in the world would suggest that a barbell is not a versatile, highly useful piece of training equipment. The same is true for the Isochain.

The main issue for many athletes in approaching isometric training is not the lack of drills available. The main issue is *psychological*. This is particularly true for athletes with a background in regular training methods; they find the lack of movement disconcerting. Even if they are aware of the science and the studies, at some level they wonder how pushing and pulling hard could possibly be a productive training methodology. There is the lingering belief that isometric strength is somehow not “real” strength. So before we dive into the drills, let’s take a minute to look at three examples which disprove this old error:



Both a barbell and an Isochain are points of vertical resistance; one exploits dynamic movements to develop strength, one exploits static holds to

develop strength. Both are equally versatile training tools.

1. Isometric strength is functional strength

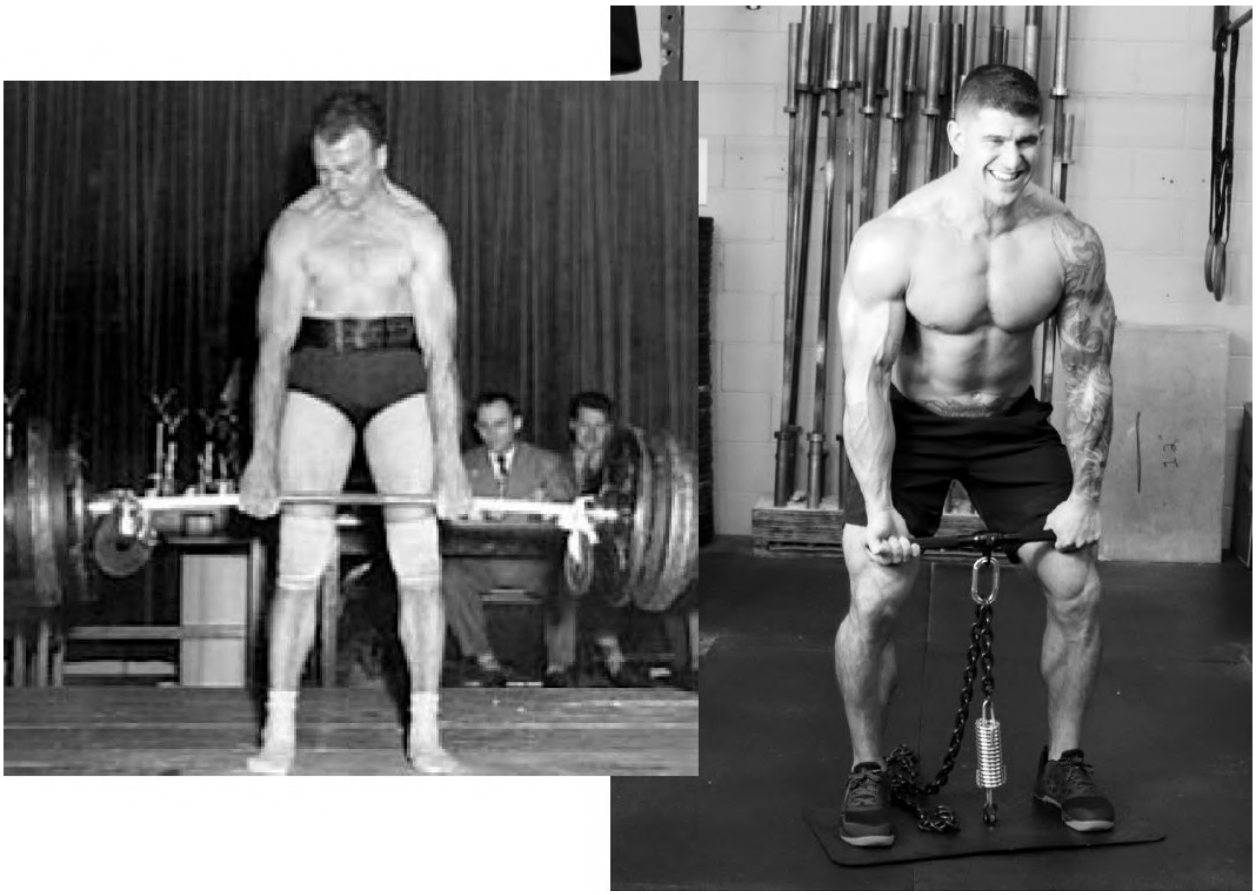
Outdated ideas about isometrics are based around fallacies which are easily exploded. The first point to remember is that much of what we think of as real, "everyday" functional strength is actually *isometric* in its nature, anyway. Imagine, for example, helping a friend carry a heavy fridge; you wedge your forearms under the machine, and walk away with it. Although you are moving the weight by *walking* with it, the most difficult aspect is not the walking part—that's relatively easy. The feat of strength is being able to *hold up* the heavy fridge with the upper-body. This is pure isometrics. It's essentially an isometric curl. The same is true of holding and carrying a barrel, a heavy stone, or anything. It's how the body evolved to work.

Carrying a barrel; the hardest part of this task is keeping the elbows bent in a fixed position under heavy load; this is isometrics.

Whenever you look at real-world strength, isometrics is always an important element, *even where moving is involved*. If you think about wrestling, one of the keys to victory is the ability to grapple and be able to hold an opponent; this is largely isometric. Think about pushing a vehicle; keeping the trunk and arms held straight is essential. Isometric strength is a vital part of functional strength.

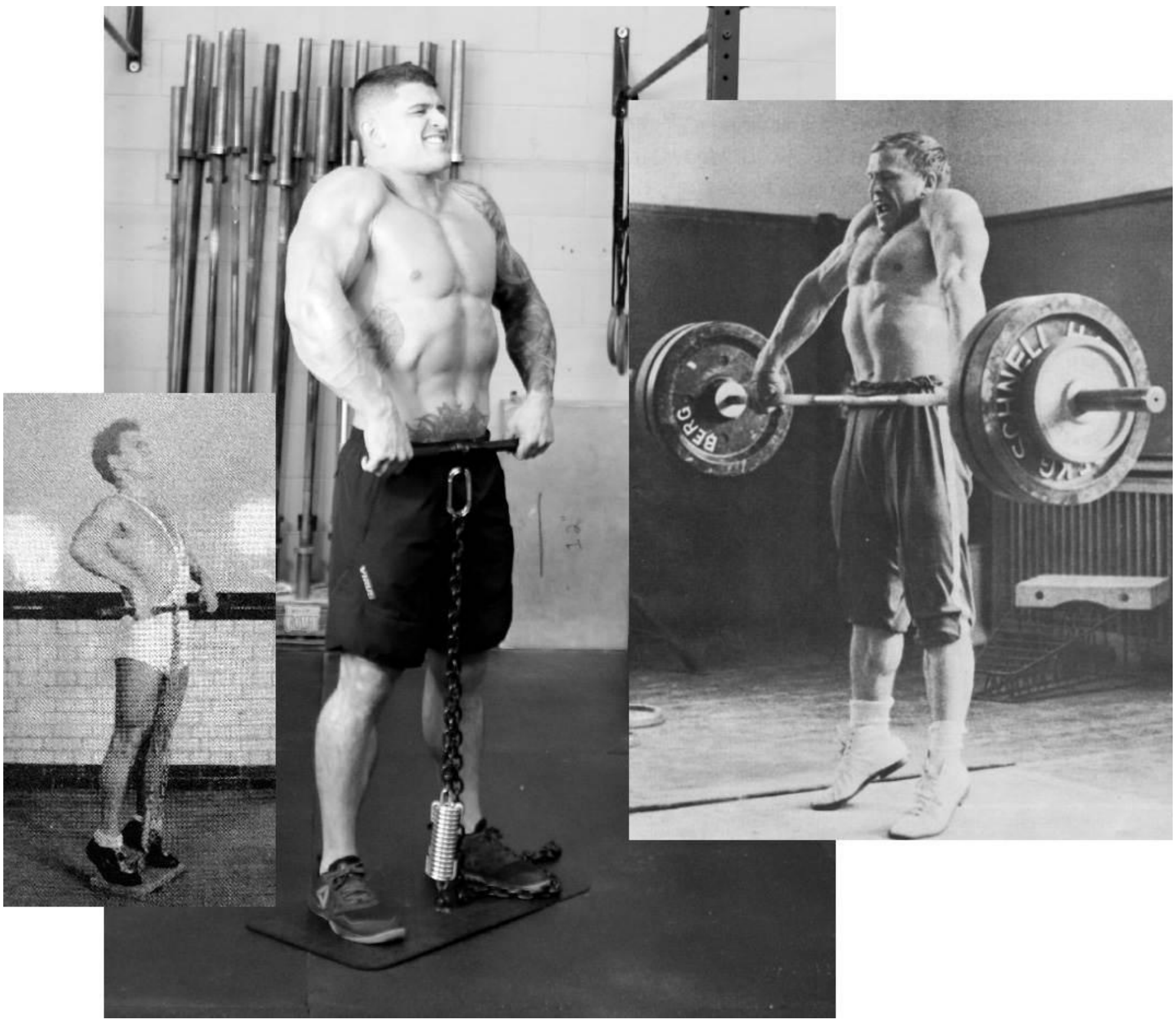
2. Isometric strength is essential for strength sports

This principle is not just true in "real world" examples of strength. It's equally true in classical strength sports. The deadlift, used in powerlifting, is a good example. It's often considered the ultimate example of *back* strength; but in a correctly performed deadlift, the spinal erectors do not move—they are held in place *isometrically.* Similarly, for most athletes the weakest link in the deadlift is the *grip* (which is why lifters use wrist straps). The grip strength used in the deadlift (and all such lifts) is isometric. Even the muscles of the feet fire isometrically. All heavy lifting requires significant isometric strength, at some level.



Isometric strength is a huge element of any kind of strength, and certainly, an athlete with superior isometric strength—all else being equal—will inevitably be victorious. This is just one reason why all the greatest strength coaches of history—from Hoffman to Starr to Pavel Tsatsouline to Louie Simmons—recommend isometric training to their athletes.

Another reason is that isometrics is the best possible way for a strength-sports athlete to work on his or her weak links. If you think about it, every single lift has a "sticking point", or weak spot, which the athlete finds the trickiest; for example, the arm extension in arm wrestling, or the bottom position of a clean in Olympic lifting. Isometrics is the only method where you can work *exclusively* on that exact angle of an exercise, providing the greatest possible training results on a rep-by-rep basis.



Isometric clean pull vs weightlifting clean pull

3. Isometrics builds "bulletproofing" strength

As well as having a key function in strength sports, isometrics also play a completely unique and invaluable role in the type of strength that keeps the

body *injury-free*. This is because isometric strength is the strength that stabilizes the body—without stability, the human body is remarkably easy to injure under pressure. But the greater stability—isometric strength—your muscles have, the less chance there is for you to become injured. In essence, isometric training is a “bulletproofing” method which *all* athletes should be performing: not just strength athletes.

Ankle injuries are a great example. If we look at the kind of ankle injuries incurred by runners, it is clear that they often occur when the foot unexpectedly turns over. However, if the tibial muscles of the lower legs have a high level of isometric strength, this is almost impossible.

One of the major issues faced by athletes is back pain. During all movements of the trunk the lumbar spine is held in place isometrically by the *transversus abdominis* and *multifidus* muscles; if these muscles are weak, lower back strains and pain are inevitable. Isochain training is the best possible way to condition these muscles to a high level, and thus avoid or rehabilitate back pain and injuries.

Isometrics also bulletproof strength athletes. In a heavy squat, for example, the abductors and adductors of the thigh require great isometric strength to prevent the femurs from moving in a transverse plane; and movement along the transverse plane is a large factor in long-term knee damage and chronic pain.

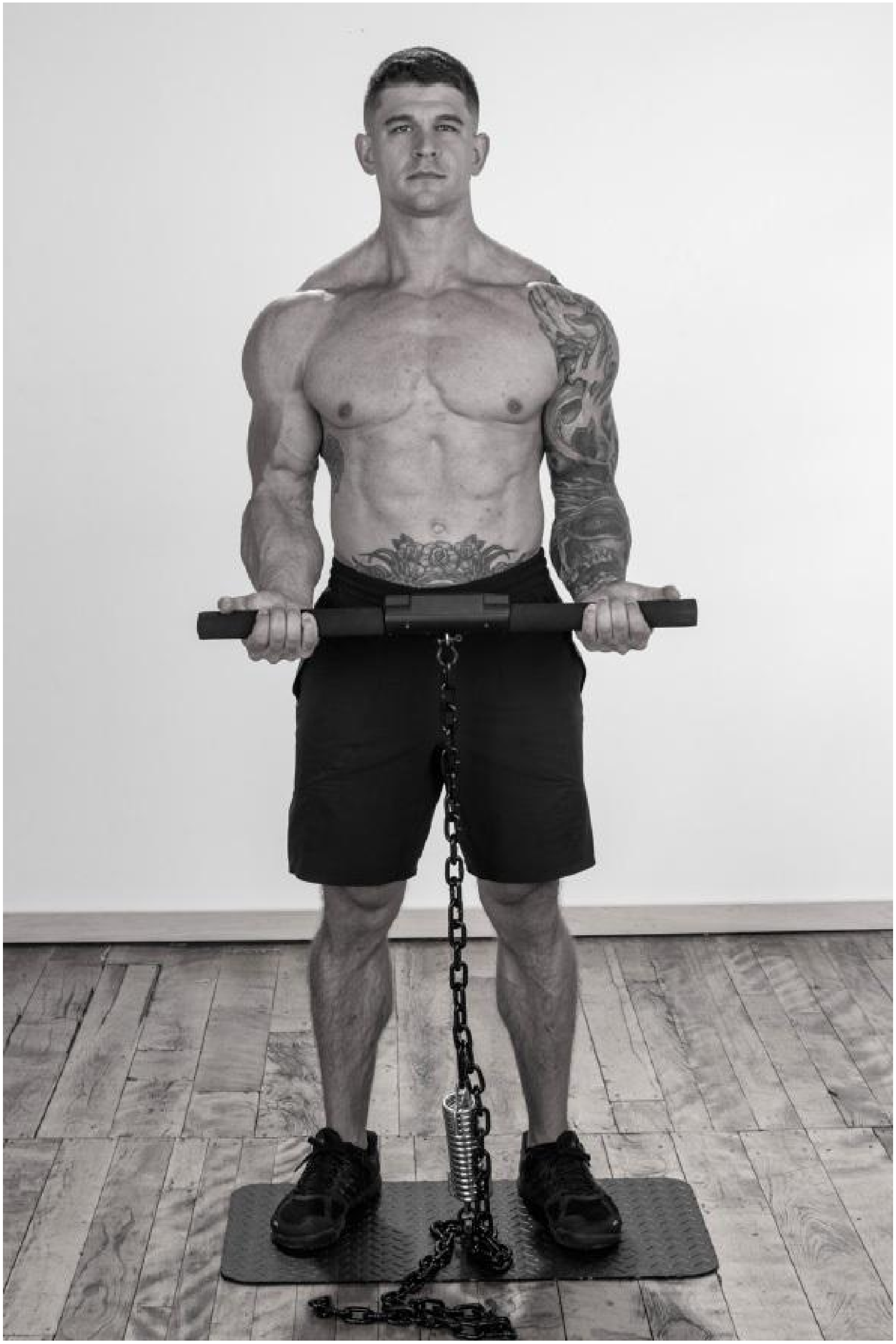
Perhaps the most common chronic problem in bodybuilding is shoulder pain. This is often due to trauma to the notorious rotator cuff muscles. During bench pressing, the rotator cuff muscles work hard to stabilize the shoulder joint; much of this is isometric. Unfortunately, traditional dynamic bodybuilding techniques such as the bench press cause the larger superficial muscles such as the pectorals to become over-strong in comparison to the deep tissues (the rotator cuff), and this is what causes chronic problems. If more bodybuilders balanced their training with isometric work, their rotator cuffs would “catch up”, eliminating the underlying issue, and allowing them to become even bigger and stronger in the long-term—injury free.

Hopefully these examples will have demonstrated definitively that isometric strength IS “real” strength. There are huge advantages to utilizing the drills in this chapter. Read this chapter and familiarize yourself with the basic drills. In Part IV of this manual we will be examining ways to combine these drills into different *programs,* in order to get the most out of them.

ADJUSTING THE ISOCHAIN: THE QUICK WAY

Before we begin the training—a few tips on preparing your Isochain for drills.

Your Isochain has an automatic *tare* function—it is calibrated to ignore the weight of the chain, and only register the user's force output. For this reason—and because it makes drills feel smoother—*always keep any loose chain at the bottom of the device.* The top link of the chain should be attached to carabiner under the handle with no slack.



An Isochain at hip-height. Note that there is no slack at the top of the chain —only the bottom. You never need to touch the top carabiner.

When you are ready to move to a different exercise, and alter the height of the chain, the easiest way to do so is to rehearse the exercise with the chain unattached. This becomes very easy with a little practice.

Let’s say you want to perform a fairly high isometric curl. Simply follow this protocol:

A. Lay down the handle carefully, and disconnect the chain from the lower carabiner. The chain is now loose.

B. Pick up the handle—the chain now unattached to the spring—and raise it the height you want for the exercise—say, sternum height. Look down, and identify which chain link will be a few inches (spring and carabiner length) above the baseplate (this can be an approximate). Keep an eye on this area of chain.

C. Kneel down again, and attach that link to the lower carabiner.

D. Your bar will now be at the desired height.

After a while, you won't even need to rehearse the drills with the chain unattached to the spring—you'll instinctively know the height the handle needs to be for various drills.

ISOMETRICS: ESSENTIALS

This section of the manual will describe technical aspects of different Isochain drills: however, some fundamental elements are essential to ALL drills:

- ✔ ***Warm up:*** *Being fully warmed-up up before isometric drills increases safety but also ramps up performance levels. Before hitting your drills hard, exploit a general warm-up for the entire body (chapter 11), and follow it up with specific warm-ups prior to individual exercises (page 294).*

- ✔ ***Total-body tension:*** *Isometric drills are not isolation exercises. To generate maximum force in any drill, your entire body needs to be flexed powerfully; tense and set your legs, and brace your core, spine, shoulder girdle and grip as hard as iron for each rep, to get the best results. This aspect of static training is one of the reasons isometrics builds total body power so rapidly. Brace yourself!*

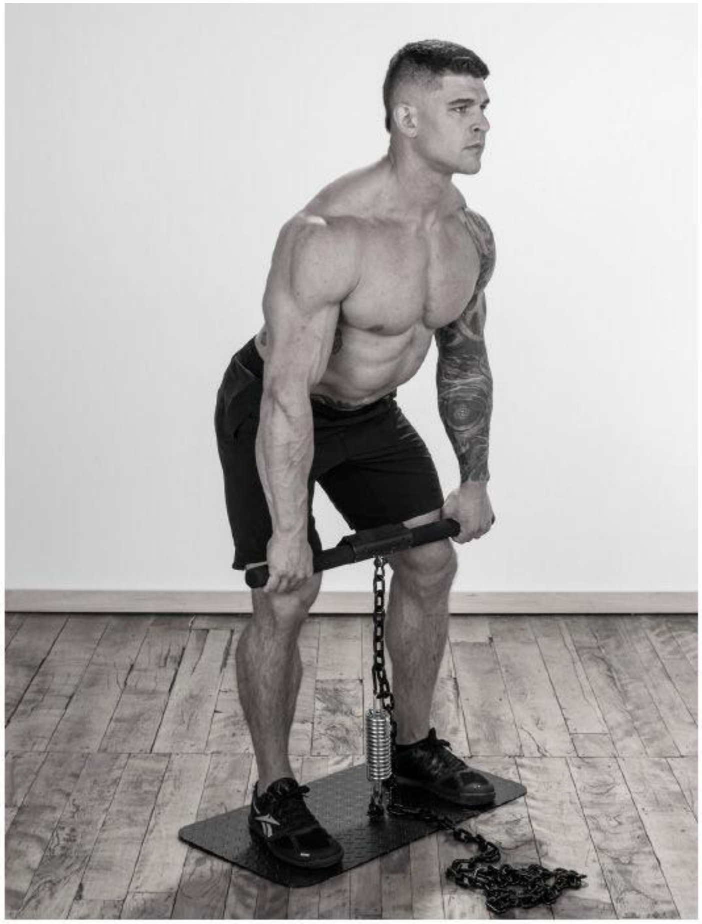
- ✔ ***Utilize "rise time":*** *It takes the body several seconds to generate maximum force levels in isometrics—this is called "rise time". Allow for this, and make it part of your technique. Slowly build up maximum force over several seconds before hitting your peak force level on any rep—never just "yank" at the bar.*

- ✔ ***Breathing:*** *Always remember to breathe during isometric drills. Inhale and exhale smoothly and naturally behind your braced abdominals during any static hold, however brief. Avoid the urge to hold your breath. The Valsalva Maneuver is contraindicated during isometrics.*

- ✔ ***Neutral neck:*** *Seek to look forward or slightly up during most drills; this will help keep your cervical spine neutral, and your back flat. Avoid the temptation to compulsively look down at the console, as this will cause the neck to bend and the back to round. Utilize the audio*

feedback instead.

DEADLIFT



MIDDLE POSITION

BOTTOM POSITION

TOP POSITION

ISOCHAIN HANDLE LEVEL:	***Top:***	Mid-thigh
	Middle:	Knee
	Bottom:	Shin

PERFORMANCE:

Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. With your knees bent and the handle close to your legs, smoothly pull upwards. Breathe naturally throughout the exercise.

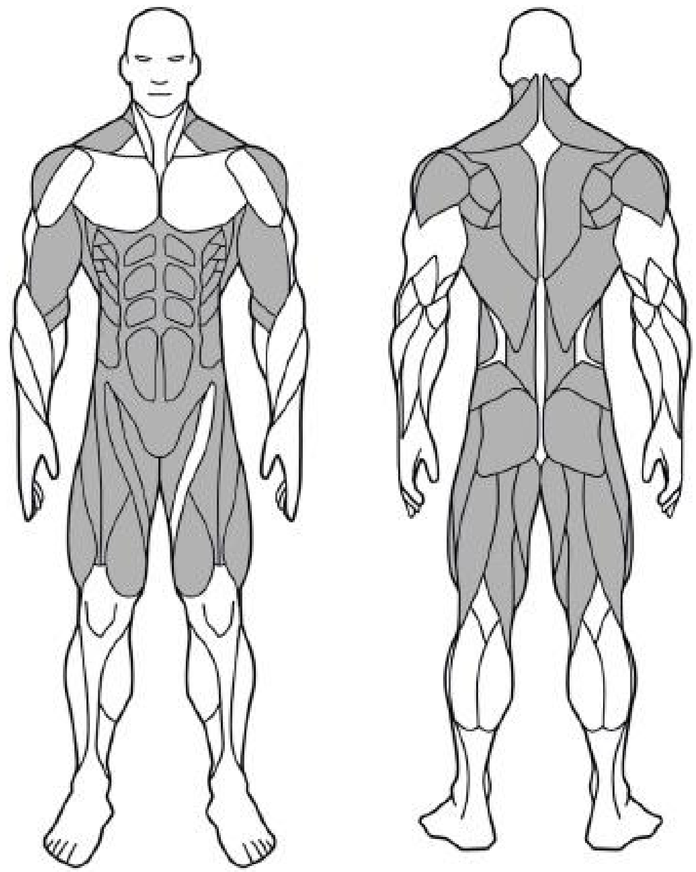
MASTER CUES:

- Keep the knees bent and the back flat. Do not allow the spine to round.
- Brace the stomach muscles for added protection.
- Keep the head up; look forward, not down.

MUSCLES RECRUITED:

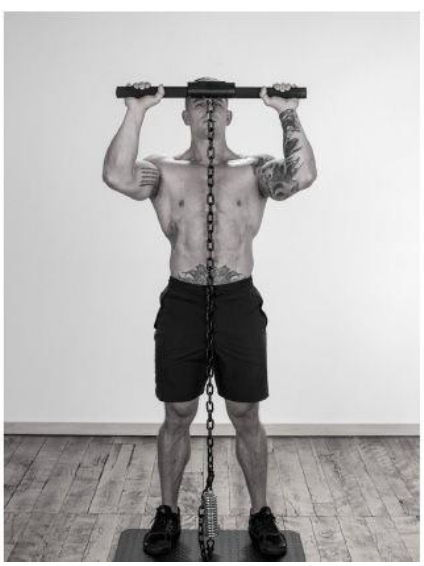
Biceps femoris, gluteal muscles, spinal erectors, quadriceps, latissimus dorsi, upper back complex, trapezius, abdominals, grip muscles.

ANATOMICAL CHART

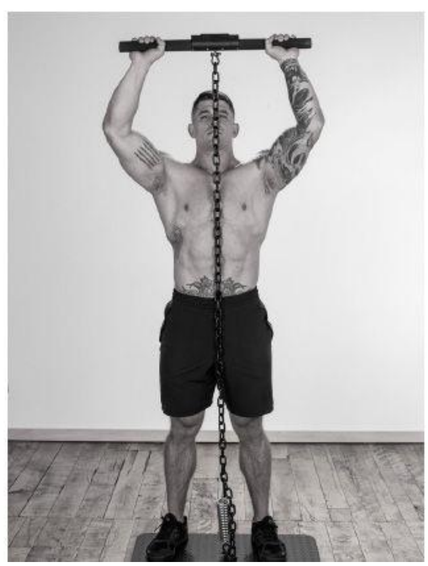


SHOULDER PRESS

MIDDLE POSITION



BOTTOM POSITION



TOP POSITION

ISOCHAIN HANDLE LEVEL:	***Top:***	(Nearly) arm's length above head
	Middle:	Top of head
	Bottom:	Upper chest

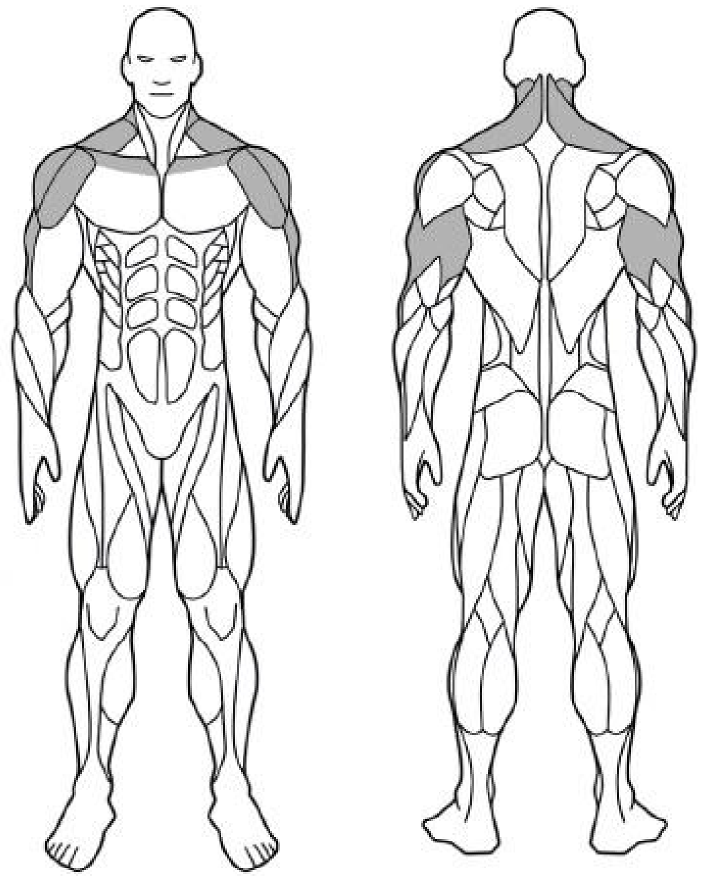
PERFORMANCE: Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. With your hands above your chest, push upwards against the handle. Breathe naturally throughout the exercise.

MASTER CUES:

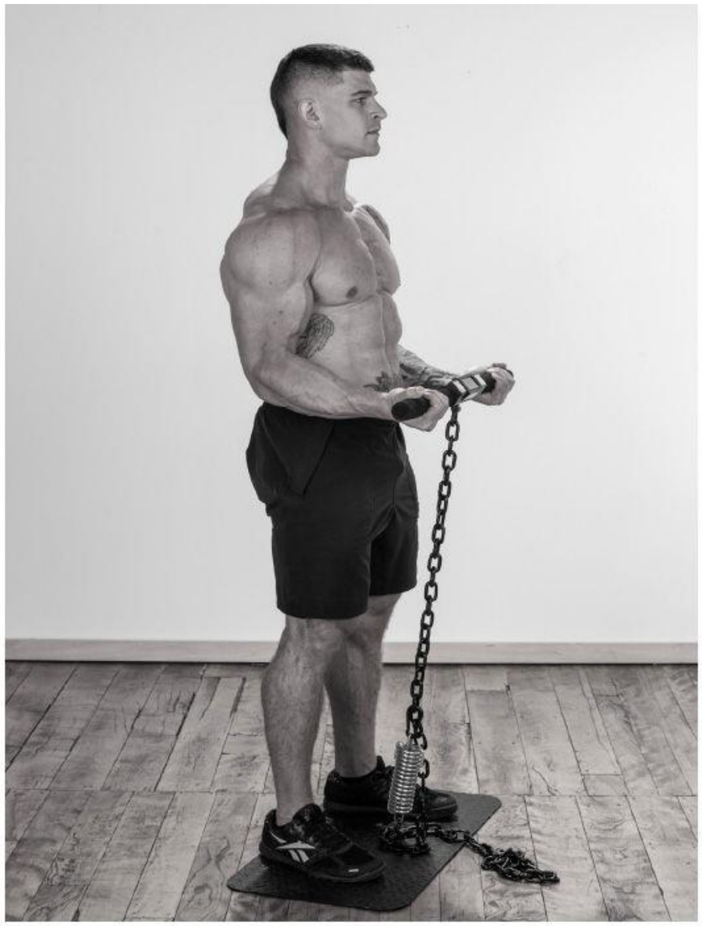
- Do not force the elbows out to the sides; keep them in a natural position in front of you.
- Resist the urge to lean back; keep the trunkstraight.
- Brace the stomach muscles for added protection.

MUSCLES RECRUITED: *Anterior deltoid, lateral deltoid, trapezius muscles, triceps.*

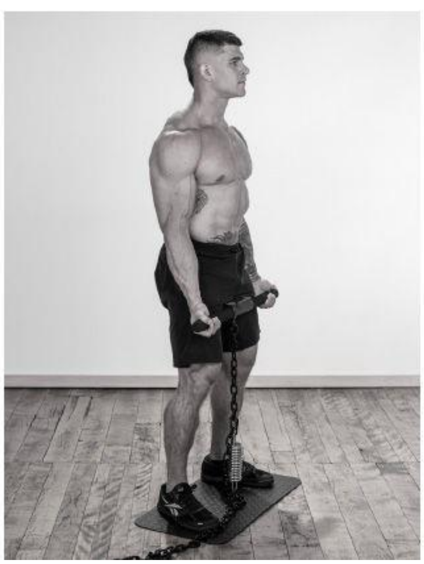
ANATOMICAL CHART



BICEPS CURL



MIDDLE POSITION



BOTTOM POSITION

TOP POSITION

ISOCHAIN HANDLE LEVEL:	***Top:***	Upper chest
	Middle:	Elbow height (arms down)
	Bottom:	Upper thigh

PERFORMANCE:

Stand securely on the baseplate. Squeeze the handle with an underhand grip, with thumbs around the bar. Keeping your upper arms locked to your sides, push upwards against the handle. Breathe naturally throughout the exercise.

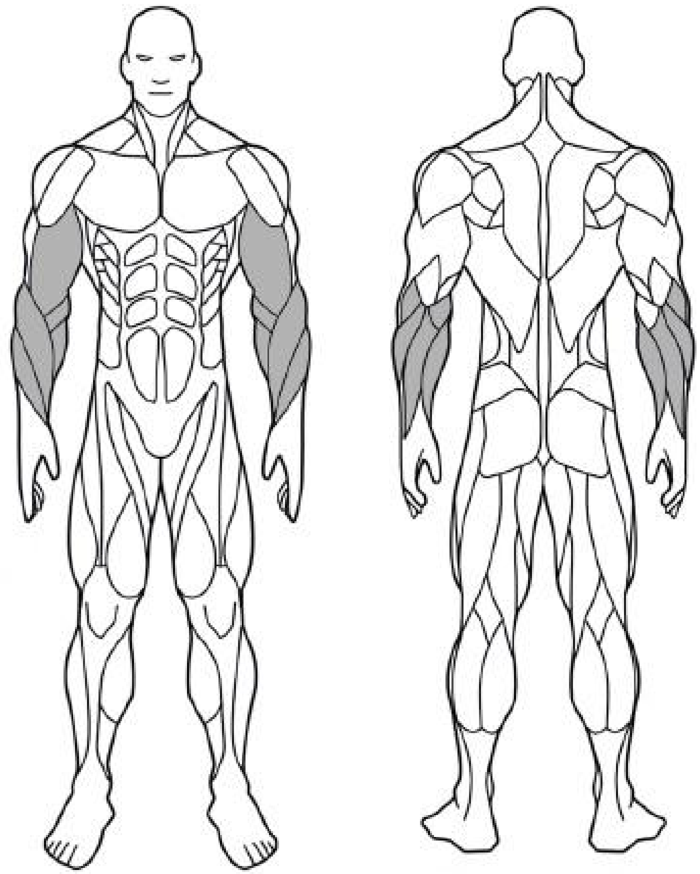
MASTER CUES:

- Do not permit the elbows to drift away from the torso.
- Keep the shoulders down.
- Keep wrist bend minimal.

MUSCLES RECRUITED:

Biceps, brachioradialis, brachialis, forearm flexors, grip muscles.

ANATOMICAL CHART



FRONT SQUAT

MIDDLE POSITION

BOTTOM POSITION

TOP POSITION

ISOCHAIN HANDLE LEVEL:	***Top:***	Lower chest
	Middle:	Abdomen
	Bottom:	Hip

PERFORMANCE:

Stand securely on the baseplate. Grip the handle, and squat down under it, with the center of the bar on your upper chest and your elbows underneath and held away from your torso. Push upwards against the handle using leg power. Breathe naturally throughout the exercise.

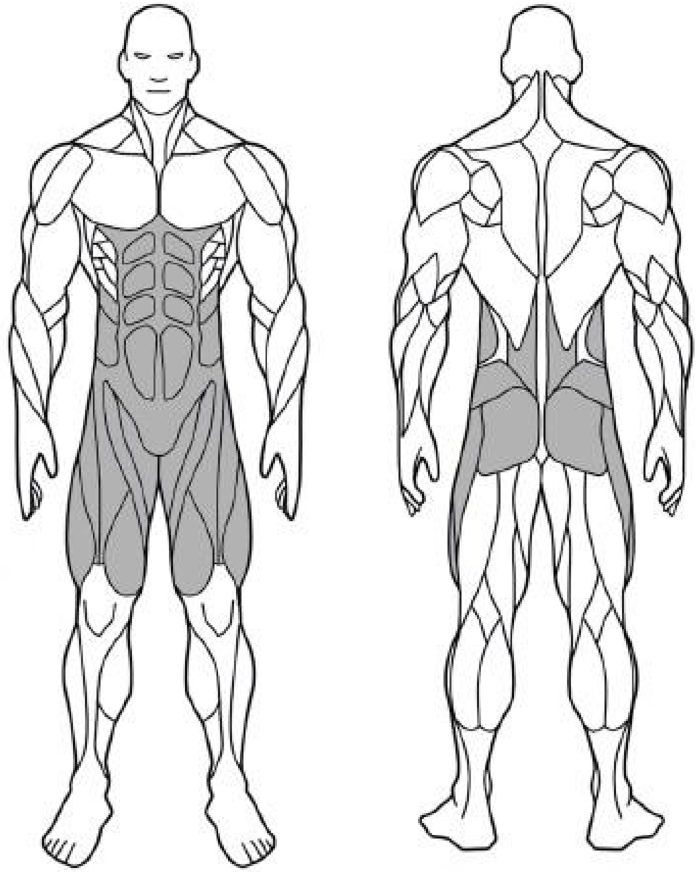
MASTER CUES:

- Keep your back flat and your head up.
- Try to keep your trunk as vertical as possible; avoid "bowing" forward.
- Keep the feet flat on the baseplate; do not raise the heels.

MUSCLES RECRUITED:

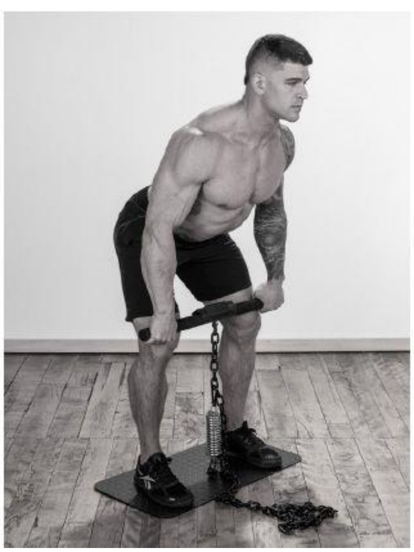
Quadriceps, gluteal muscles, spinal erectors

ANATOMICAL CHART

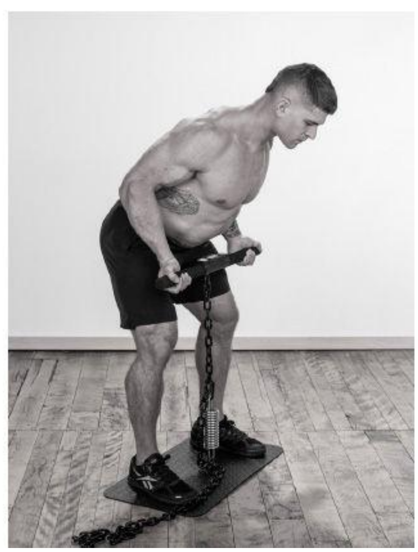


BENT ROW

TOP POSITION



BOTTOM POSITION



VARIATION: Reverse grip

ISOCHAIN HANDLE LEVEL:	***Top:***	Mid-thigh
	Middle:	Lower thigh
	Bottom:	Knee to shin

PERFORMANCE:

Stand securely on the baseplate. Squeeze the handle with an overhand grip. Bend over, with a flat back and a bend at the knee. Pull hard on the bar, attempting to draw it into your torso. Breathe naturally throughout the exercise.

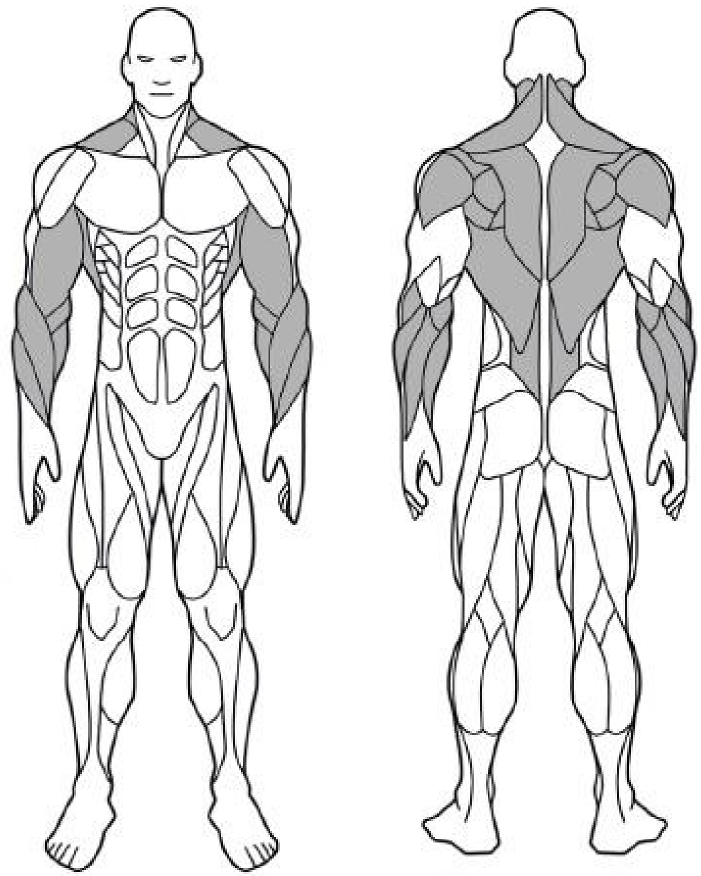
MASTER CUES:

- Keep the knees bent and the back flat. Do not allow the spine to round.
- Brace the stomach muscles for added protection.
- Keep the head up; look forward, not down.

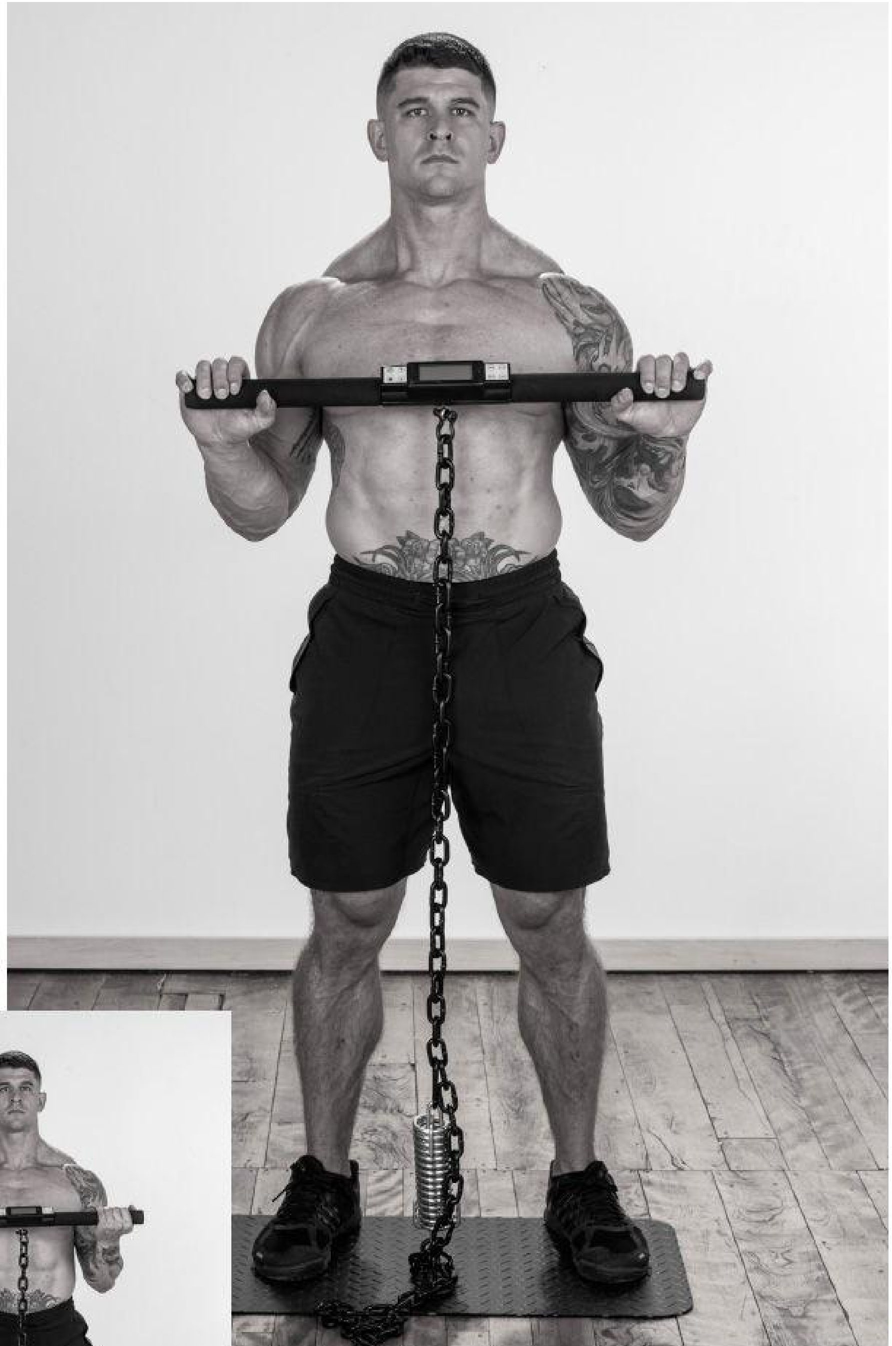
MUSCLES RECRUITED:

Latissimus dorsi, upper back complex, biceps, trapezius, spinal muscles, forearm complex, grip muscles.

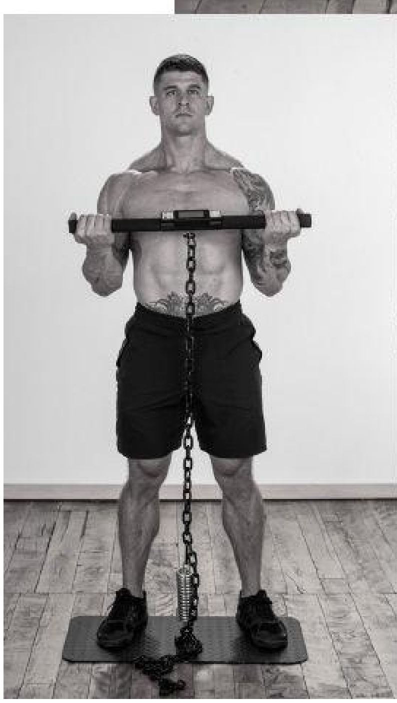
ANATOMICAL CHART



CHEST PRESS



MIDDLE POSITION

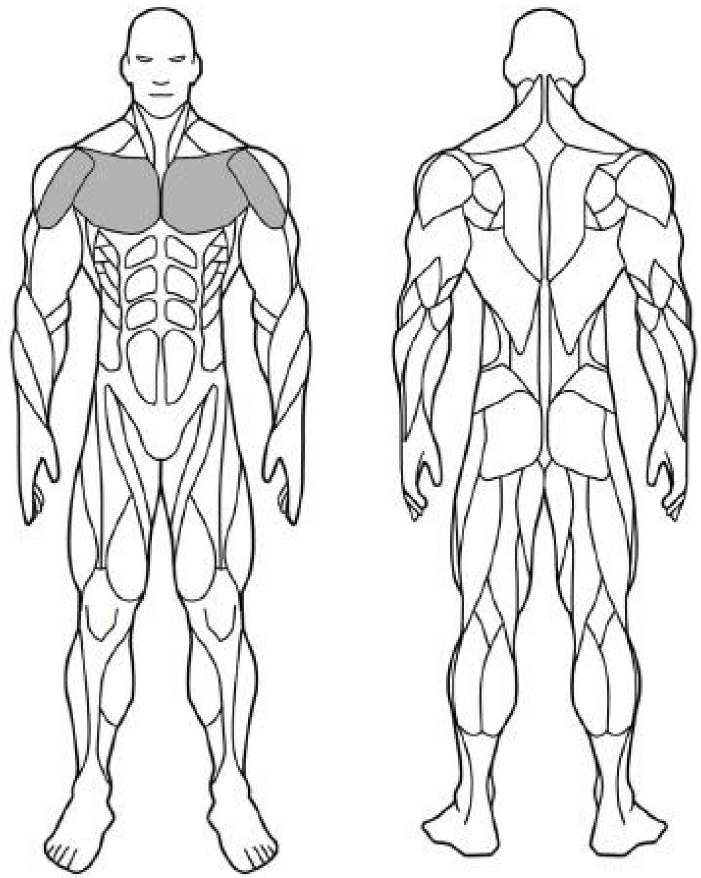


VARIATION: Reverse grip

PRO TIP: The key to success in activating the pectorals with isometric chain presses is finding the "sweet spot"—if the bar is too low, or too high, the deltoids (shoulder muscles) will begin to take over.

ISOCHAIN HANDLE LEVEL:	Sternum
PERFORMANCE:	Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. With the bar tight to your sternum, push upwards against the handle. Breathe naturally throughout the exercise. *Performed correctly, this exercise excellently mimics the bottom position of the bench press. You do not need a horizontal press to work the chest muscles maximally—this works equally well. Tensing the pectorals hard will help you find the right "groove".*
MASTER CUES:	• Keep the elbows tight to the lats. • Push up and forward—this is not a curl. • Tense the pectorals hard for added irradiation.
MUSCLES RECRUITED:	*Pectoral muscles, anterior deltoid.*

ANATOMICAL CHART

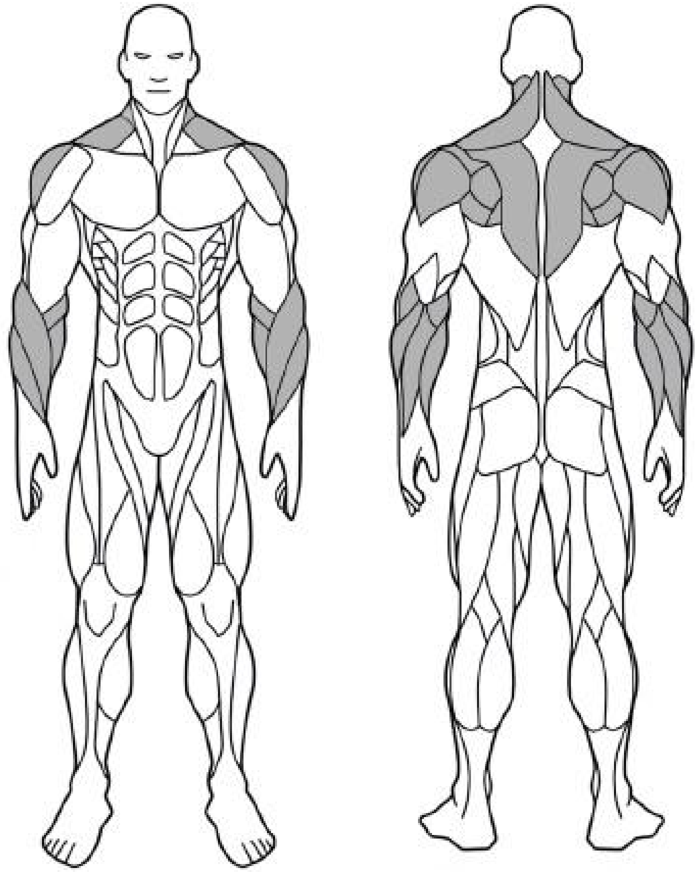


SHRUG

VARIATION: Behind-the-back

ISOCHAIN HANDLE LEVEL:	Around upper-thigh
PERFORMANCE:	Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. Pull smoothly at the handle by raising your shoulders as high as they will go. Keeping your arms and legs tensed and strong but straight, pull upwards against the handle. Breathe naturally throughout the exercise.
MASTER CUES:	• Do not lean back. This is not a back exercise. • The arms can be kinked, but try not to bend them excessively. This is not an arm exercise. • Keep the back and core tight.
MUSCLES RECRUITED:	*Trapezius, upper back complex (rhomboids, teres, trapezius, etc.), grip muscles, posterior and lateral deltoids.*

ANATOMICAL CHART

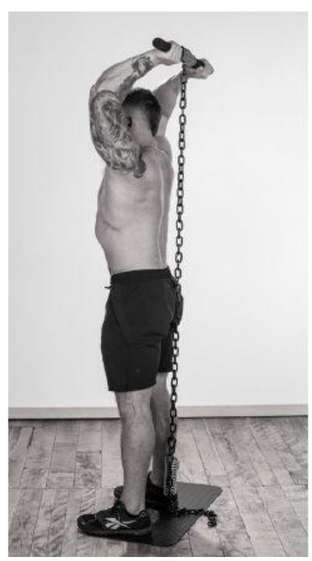


TRICEPS PRESS

VARIATION:
Reverse grip

MIDDLE POSITION

BOTTOM POSITION



TOP POSITION

ISOCHAIN HANDLE LEVEL:	***Top:***	Several inches above top of head
	Middle:	Top of head
	Bottom:	Traps

PERFORMANCE:

Stand securely on the baseplate, facing away from the handle. Hold the handle behind your head, with a thumbless, overhand grip. Point your elbows upwards as much as possible. Without moving your upper arms or trunk, press upwards against the handle. Breathe naturally throughout the exercise.

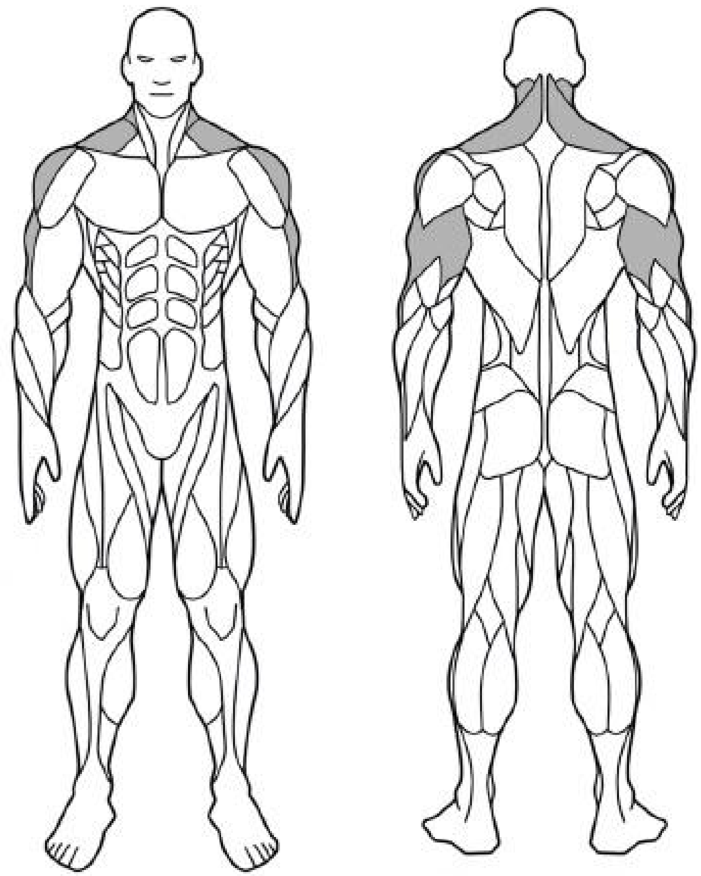
MASTER CUES:

- Keep the upper arms as vertical as possible.
- Do not flare the elbows out, but allow them to find a natural position.
- Look forward; avoid the instinct to shrug your shoulders and crane your neck.

MUSCLES RECRUITED:

Triceps, side deltoids, trapezius.

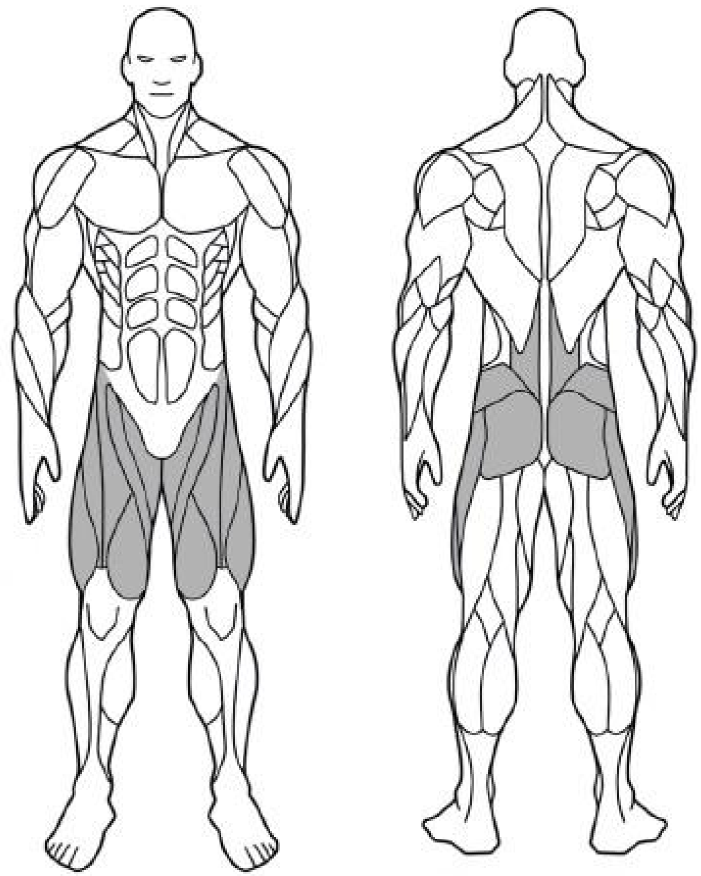
ANATOMICAL CHART



SPLIT SQUAT

ISOCHAIN HANDLE LEVEL:	Solar plexus/upper abdomen
PERFORMANCE:	Place one foot near the center of the baseplate, with the other foot stretched back behind you. Squat down into a lunge position, with the forward knee at a right-angle. Grip the handle, with the center of the bar on your upper chest and your elbows underneath and held away from your torso. Push upwards against the handle using leg power. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep your back flat and your head up. • Try to keep your trunk as vertical as possible; avoid "bowing" forward. • Keep the rear leg well bent, but do not touch the knee to the floor.
MUSCLES RECRUITED:	*Quadriceps, gluteal muscles, spinal erectors.*

ANATOMICAL CHART

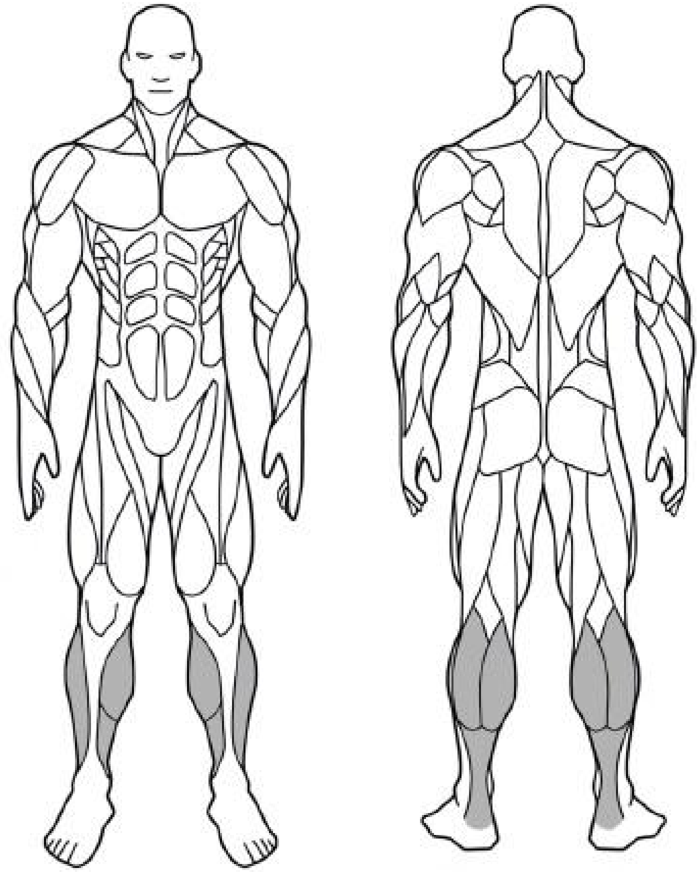


CALF RAISE

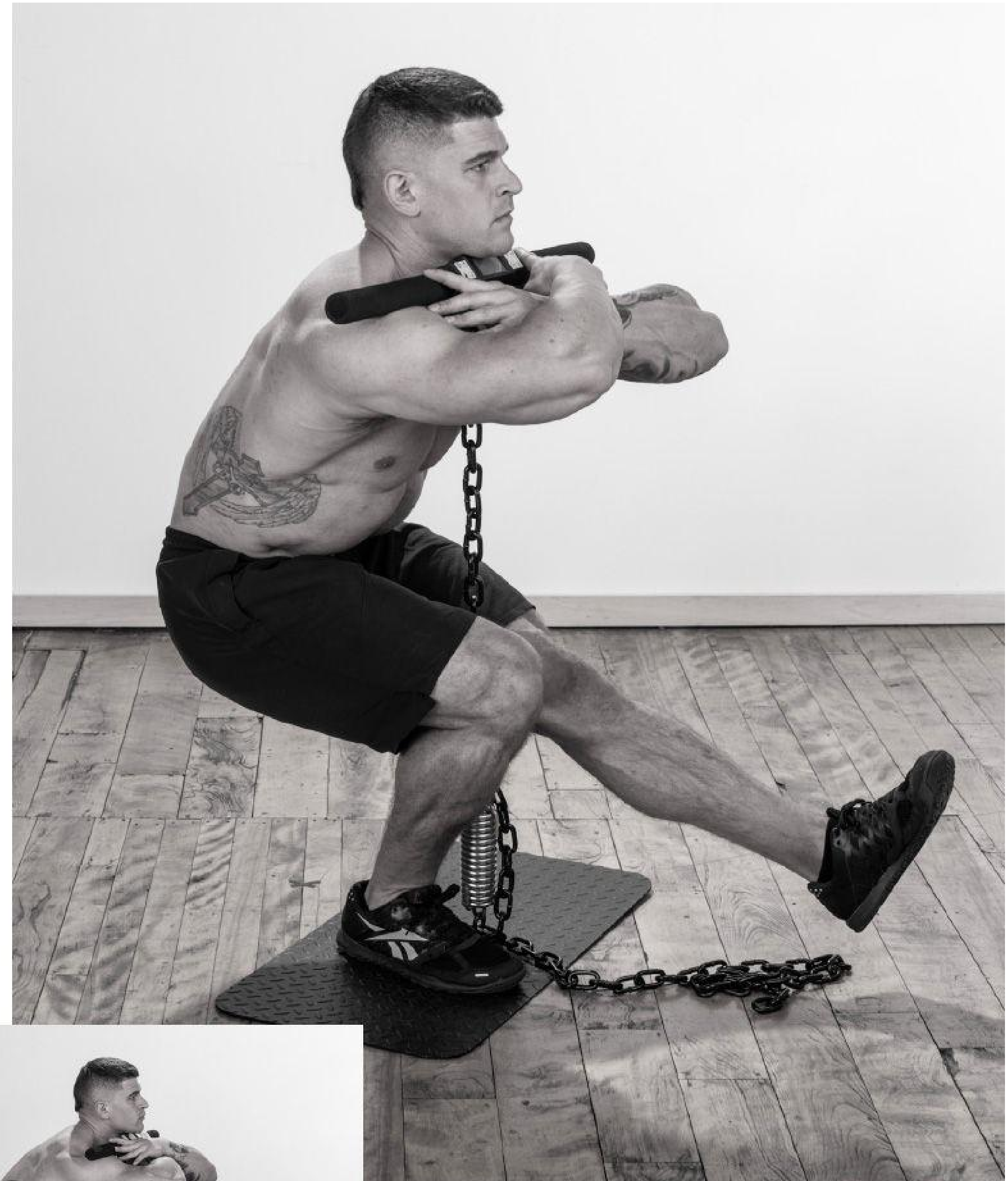
VARIATION: Deadlift-style

ISOCHAIN HANDLE LEVEL:	Upper chest
PERFORMANCE:	Stand securely on the baseplate with a shoulder width stance. Grasp the handle with an overhand grip, with thumbs around the bar. With the bar resting on your upper chest and the elbows held up, raise your heels as high as possible, transferring the force of the lift through your legs and trunk, rather than the arms. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep the knees locked and the body aligned. • Keep the shoulders square; do not "shrug" the bar up. • Maintain a straight back and braced core.
MUSCLES RECRUITED:	*Gastrocnemius and soleus (calves), Achilles' tendon, plantar muscles.*

ANATOMICAL CHART



PISTOL SQUAT



VARIATION: Assisted pistol

ISOCHAIN HANDLE LEVEL:	***Top:***	Lower chest
	Middle:	Abdomen
	Bottom:	Hip

PERFORMANCE:

Stand on the baseplate with one foot closer to center. Grip the handle, and squat down under it, with the center of the bar on your upper chest and your elbows underneath and held away from your torso. Extend one leg out in front. Push upwards against the handle using single-leg power. Breathe naturally throughout the exercise.

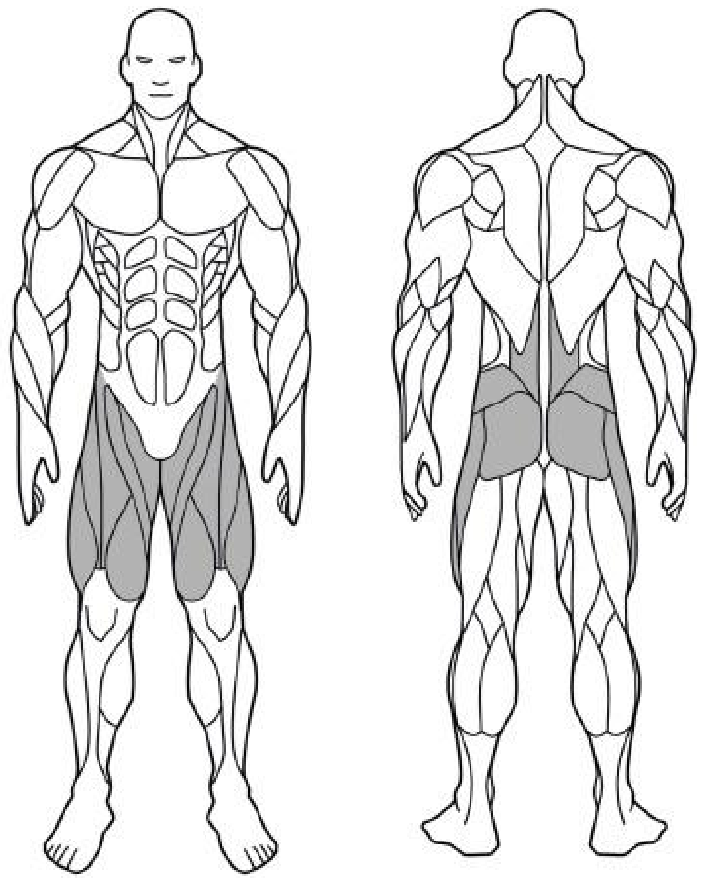
MASTER CUES:

- Keep your back flat and your head up.
- Try to keep your trunk as upright as possible.
- Keep the foot flat on the baseplate; do not raise the heel.

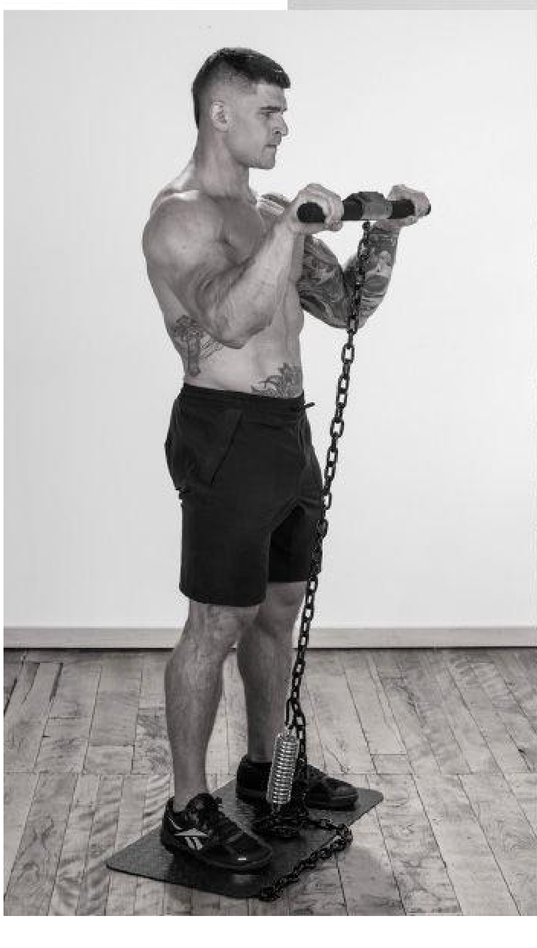
MUSCLES RECRUITED:

Quadriceps, gluteal muscles, spinal erectors

ANATOMICAL CHART



REVERSE CURL



TOP POSITION

ISOCHAIN HANDLE LEVEL:	***Top:***	Upper chest
	Middle:	Elbow height (arms down)
	Bottom:	Upper thigh

PERFORMANCE:

Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. Keeping your upper arms locked to your sides, push upwards against the handle. Breathe naturally throughout the exercise.

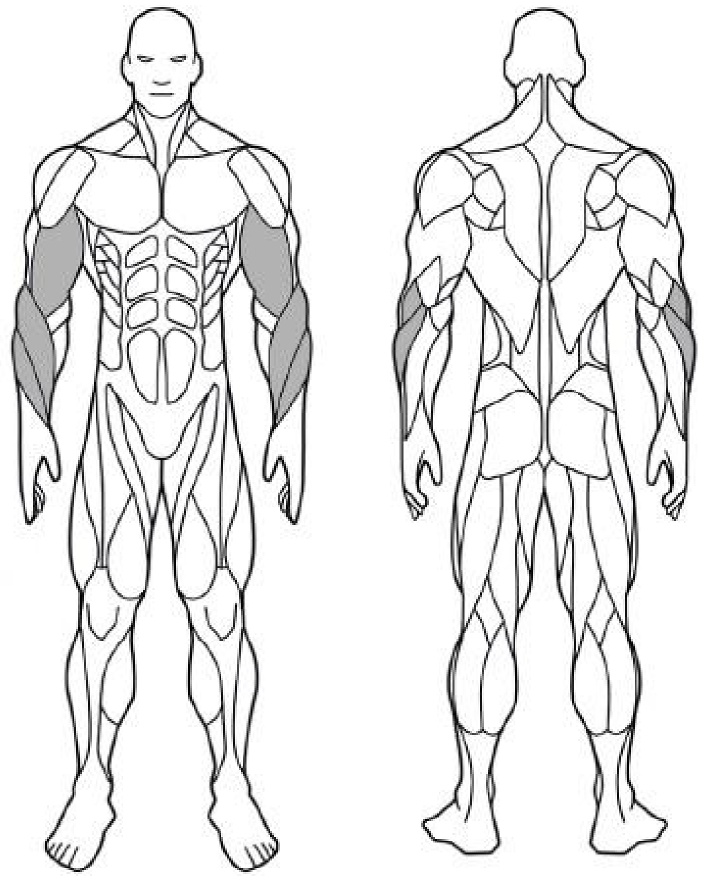
MASTER CUES:

- Do not permit the elbows to drift away from the torso.
- Keep the shoulders down.
- Keep wrist bend minimal.

MUSCLES RECRUITED:

Brachioradialis, brachialis, forearm flexors, grip muscles, biceps.

ANATOMICAL CHART



SIDE SQUAT

Reverse stance

ISOCHAIN HANDLE LEVEL:	***Top:***	Lower chest
	Middle:	Abdomen
	Bottom:	Hip

PERFORMANCE:

Plant one foot on the baseplate near the center. Bend that knee into a squat, and slide the opposite leg out to the side, keeping it straight. Chamber the bar on your upper chest. Push upwards against the handle using single-leg power. Breathe naturally throughout the exercise.

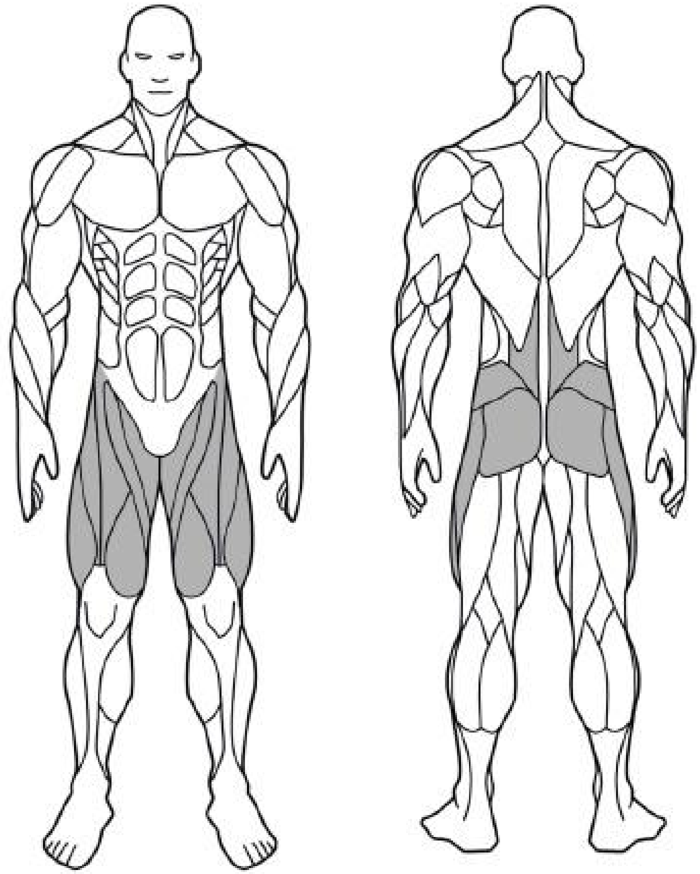
MASTER CUES:

- Keep your back flat and your head up.
- Try to keep your trunk as vertical as possible; avoid "bowing" forward.
- Keep the feet flat on the baseplate; do not raise the heels.

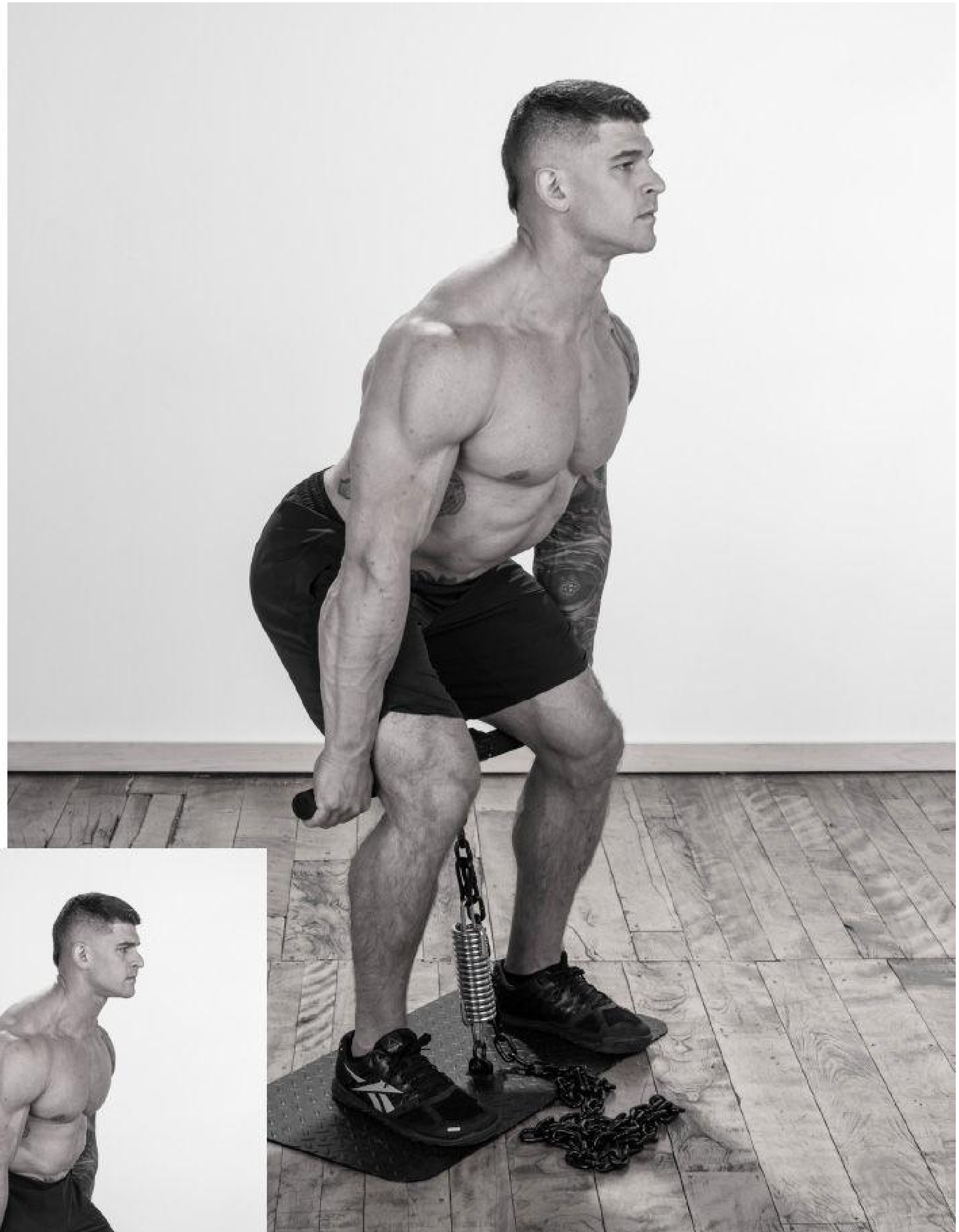
MUSCLES RECRUITED:

Quadriceps, gluteal muscles, spinal erectors.

ANATOMICAL CHART



HACK LIFT



TOP POSITION

ISOCHAIN HANDLE LEVEL: Behind the knees/thighs

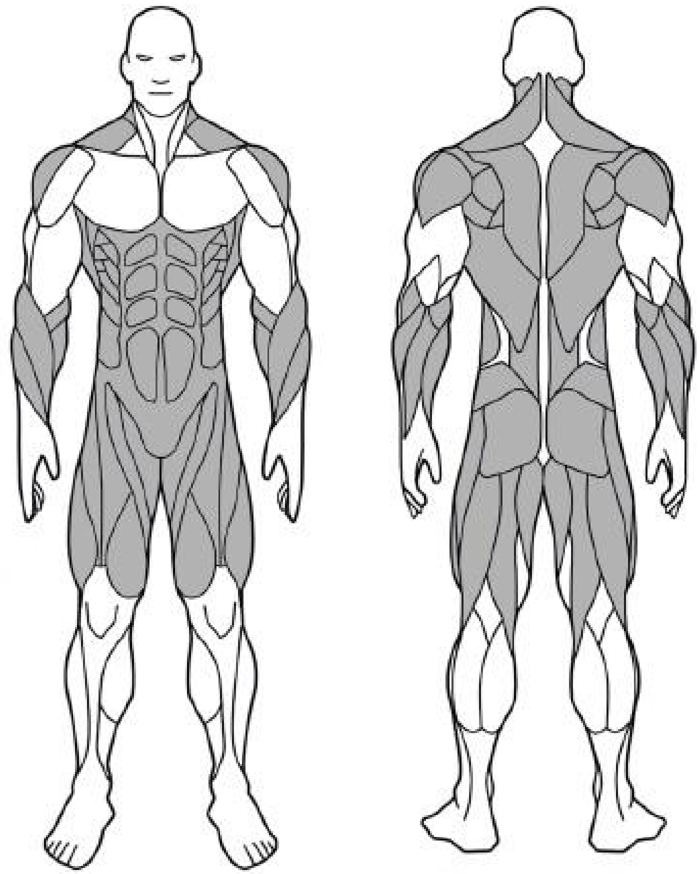
PERFORMANCE: Stand securely on the baseplate, facing away from the display unit. Squat down and grip the bar with an overhand grip, with your thumbs around the bar. The handle should be just rear of your knees. Look forward and slightly up. Pull up against the handle by pressing though the legs. Breathe naturally throughout the exercise.

MASTER CUES:

- Keep your back flat and your head up.
- Avoid tipping forward; push through the heels, rather than the toes.
- Brace the core for added protection.

MUSCLES RECRUITED: *Quadriceps, gluteal muscles, spinal erectors, abdominals, biceps femoris, grip muscles.*

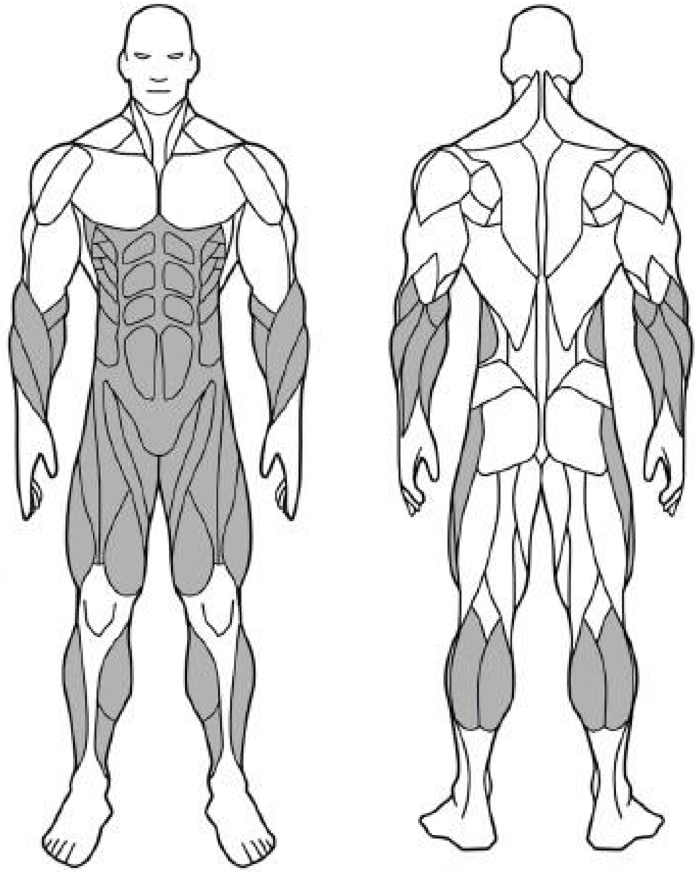
ANATOMICAL CHART



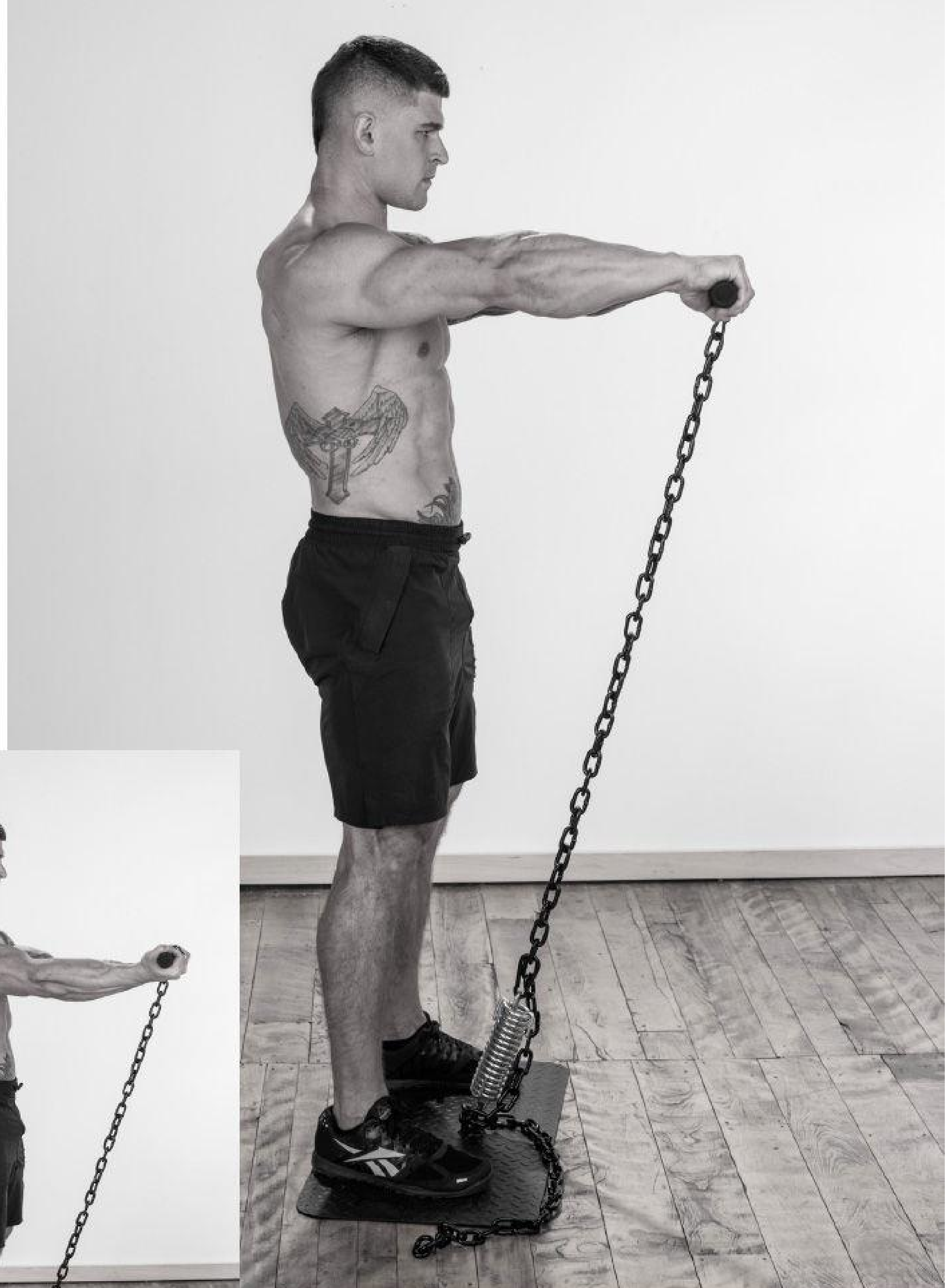
SISSY SQUAT

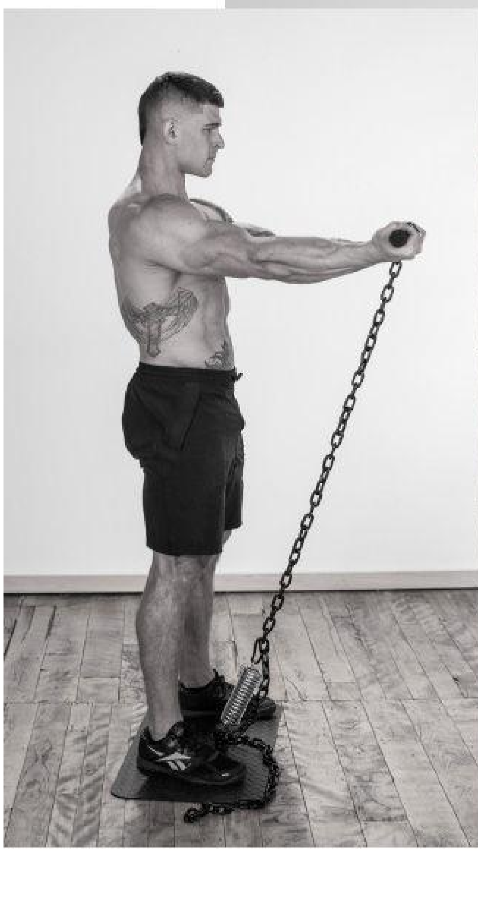
ISOCHAIN HANDLE LEVEL:	Behind the thighs
PERFORMANCE:	Stand on the baseplate facing away from the chain. Hold the bar with an overhand grip, behind your back. Use a fairly narrow stance. Bend at the knee, raise the heels, and lean backwards, pulling up. Keep the thighs and trunk in a straight line—don't bend at the hips. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep your glutes tensed to protect the spine. • Press hard though the toes to activate the quadriceps. • Balance is a factor—practice makes perfect.
MUSCLES RECRUITED:	*Quadriceps, abdominal muscles, calf muscles, grip muscles.*

ANATOMICAL CHART



FRONT RAISE

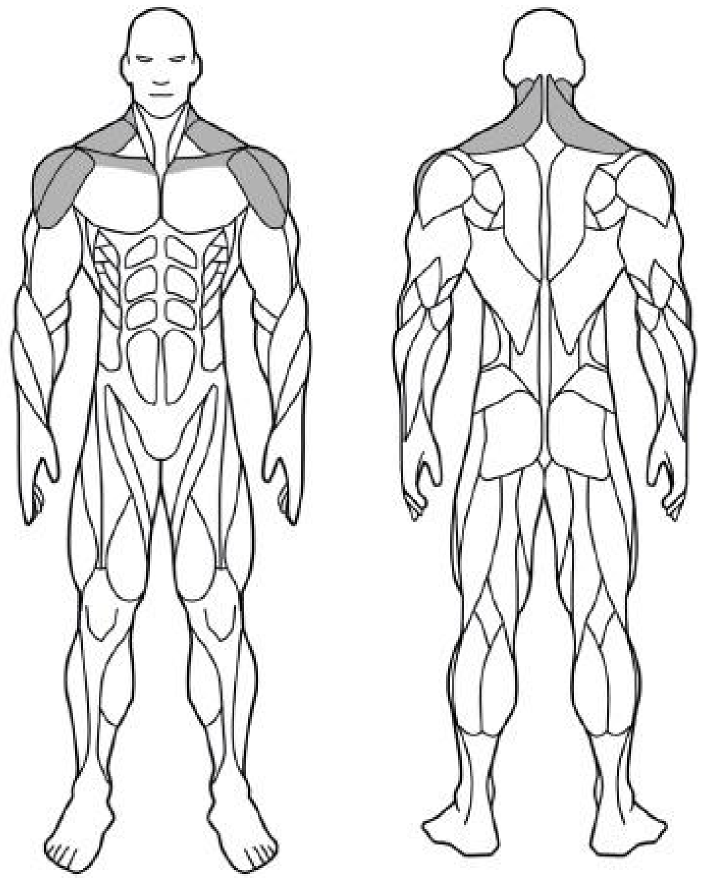




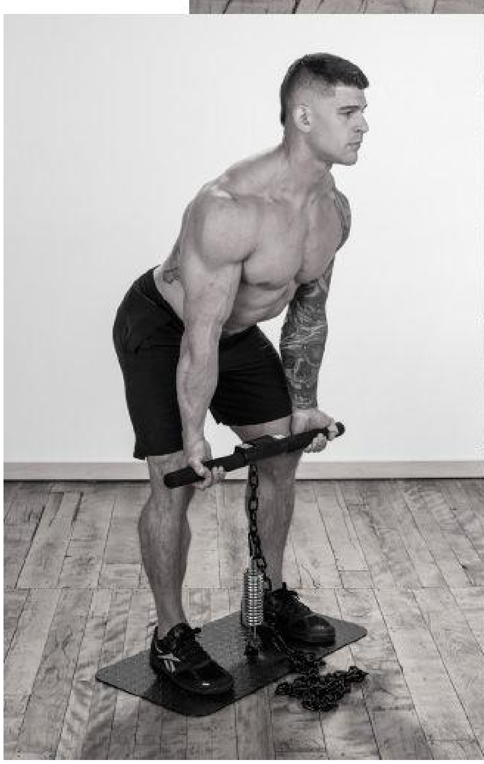
VARIATION: Reverse grip

ISOCHAIN HANDLE LEVEL:	Upper chest
PERFORMANCE:	Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. Keeping your arms out straight, raise them up to chest height, keeping the elbows angled out to the side as much as is comfortable. Push upwards against the handle. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep the arms locked straight. • Resist the urge to shrug the shoulders. Keep the shoulders down. • Keep the head up, looking forward.
MUSCLES RECRUITED:	*Anterior deltoids, lateral deltoids, upper pectorals* NB: Reverse grip variation (*see inset*) also works the biceps to some degree.

ANATOMICAL CHART



STIFF-LEG DEADLIFT



VARIATION: Reverse grip

ISOCHAIN HANDLE LEVEL:	***Top:***	Mid-thigh
	Middle:	Knee level
	Bottom:	Lower to mid-shin

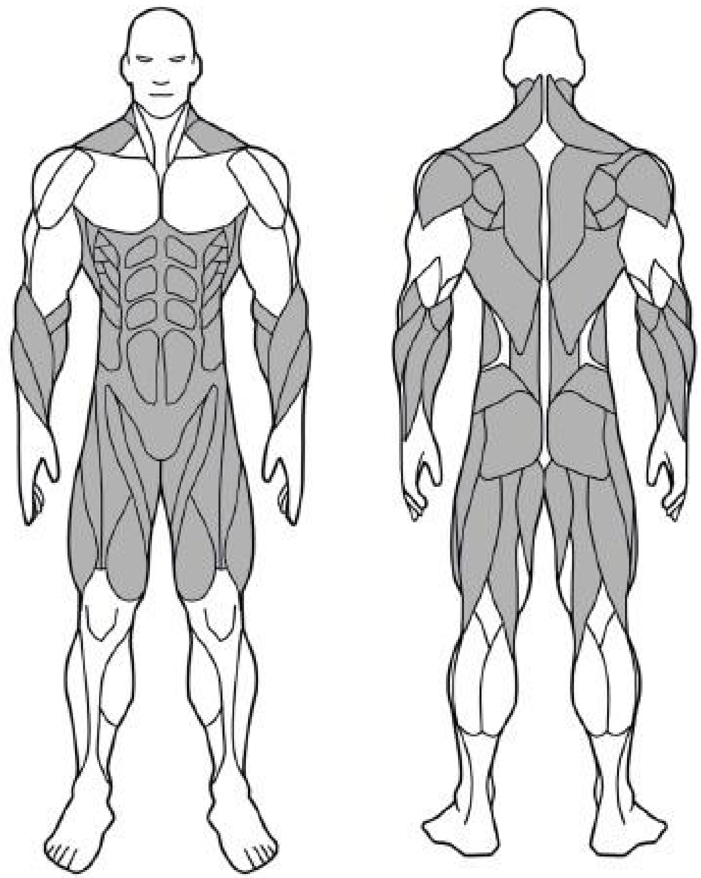
PERFORMANCE: Stand securely on the baseplate. Squeeze the handle with an overhand grip, with thumbs around the bar. Keep your legs close and only slightly bent. With the handle close to your legs, smoothly pull upwards. Breathe naturally throughout the exercise.

MASTER CUES:

- Keep the legs straight with only a slight kink at the knee; keep the back flat.
- Brace the stomach muscles for added protection.
- Keep the head up; look forward, not down.

MUSCLES RECRUITED: *Biceps femoris, gluteal muscles, spinal erectors, quadriceps, latissimus dorsi, upper back complex, trapezius, abdominals, grip muscles.*

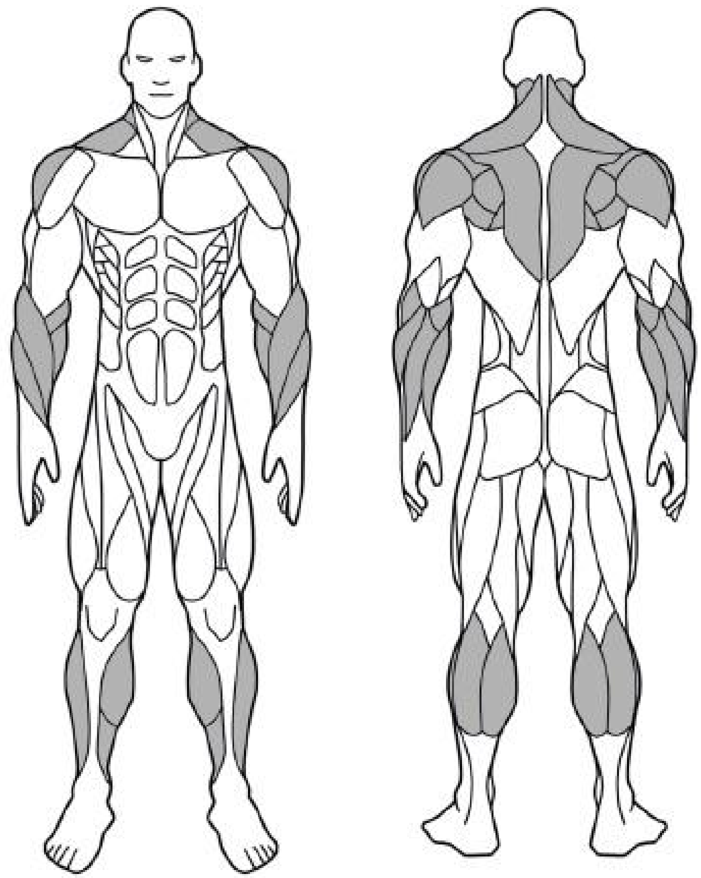
ANATOMICAL CHART



CLEAN PULL

ISOCHAIN HANDLE LEVEL:	Navel to upper abdomen
PERFORMANCE:	Stand securely on the baseplate. Squeeze the handle with a wide overhand grip, with thumbs around the bar. Pull smoothly at the handle by raising your elbows as high as they will go. The shoulders should be allowed to rise, to further engage the shoulder girdle; the heels should also rise, allowing the calves to assist with the pull. Keep your back upright, and breathe naturally throughout the exercise.
MASTER CUES:	• Do not lean back. • Keep your elbows pointing away from your body. • Keep the handle close to your trunk.
MUSCLES RECRUITED:	*Trapezius, lateral and posterior deltoids, upper back complex (rhomboids, teres, trapezius, etc.), grip muscles, gastrocnemius, soleus.*

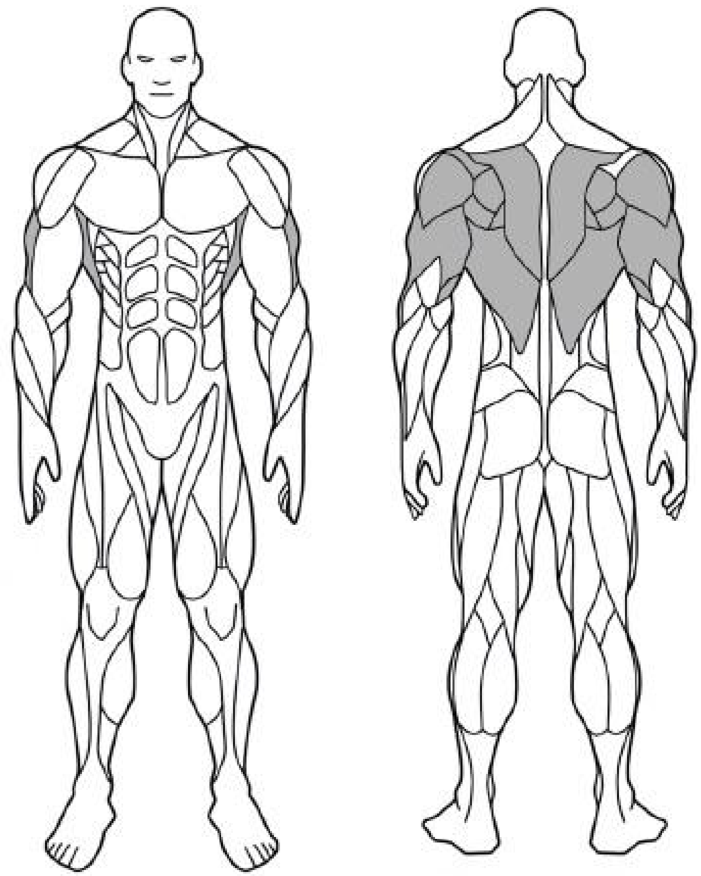
ANATOMICAL CHART



TRICEPS KICKBACK

ISOCHAIN HANDLE LEVEL:	Gluteal muscles
PERFORMANCE:	Stand securely on the baseplate, facing away from the display unit. Grip the bar with an overhand grip; palms facing the ceiling, hands positioned behind your hips. Bend forward at the waist and lock your arms, pushing up against the handle. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep the arms locked straight where possible. • Keep the head up, looking forward. • Keep the knees bent, for safety.
MUSCLES RECRUITED:	*Triceps, rear deltoids, upper-back complex.*

ANATOMICAL CHART



PLIÉ SQUAT

MIDDLE POSITION

VARIATION: Heels raised plié squat

PRO TIP: Another good way to isometrically work external rotation of the hips is to squat as far down as possible, and pry the knees out with the elbows, before pushing up. This is called an *isometric goblet squat.*

ISOCHAIN HANDLE LEVEL:	***Top:***	Lower chest
	Middle:	Abdomen
	Bottom:	Hip

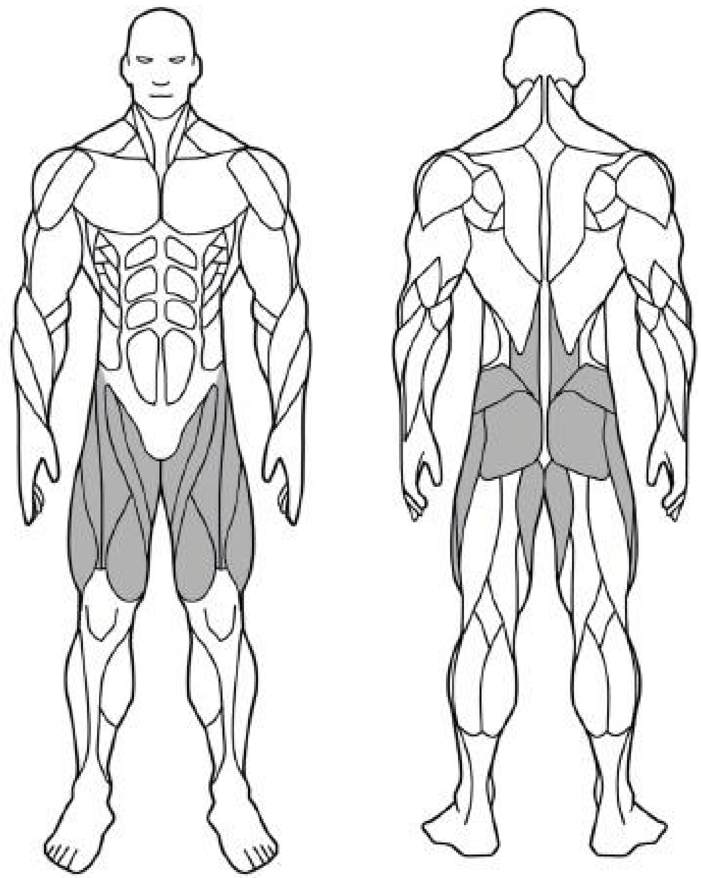
PERFORMANCE: Place your heels on the outer side edges of the platform, toes pointing to the sides. Chamber the handle on the upper chest, with the legs well-bent and the knees pointing out to the sides as far as possible, well spread. Keep the back upright and lat, and push up against the bar. Breathe naturally.

MASTER CUES:

- Keep your back flat and your head up.
- Try to keep your trunk as vertical as possible; avoid “bowing” forward.
- To get the most out of the drill, ensure your knees are pushed outwards as much as possible.

MUSCLES RECRUITED: *Quadriceps, inner thigh muscles, gluteal muscles,, spinal erectors.*

ANATOMICAL CHART



ZERCHER DEADLIFT

ISOCHAIN HANDLE LEVEL:	***Top:***	Hip
	Middle:	Knee
	Bottom:	Mid-shin

PERFORMANCE:

Stand securely on the baseplate. Bend the knees and dip your torso forward until your inner elbows are under the handle. You can hold your hands together if this feels comfortable. Smoothly pull the handle upwards with leg and back strength. Breathe naturally throughout the exercise.

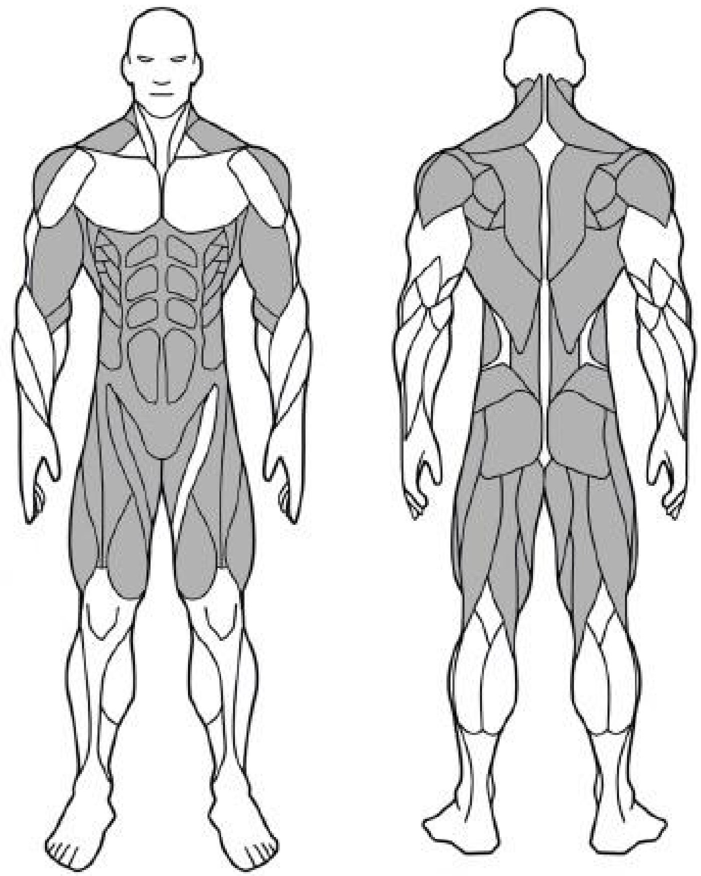
MASTER CUES:

- Keep the knees bent and the back as flat as you can.
- Brace the stomach muscles for added protection.
- Look forward, not down at the handle.

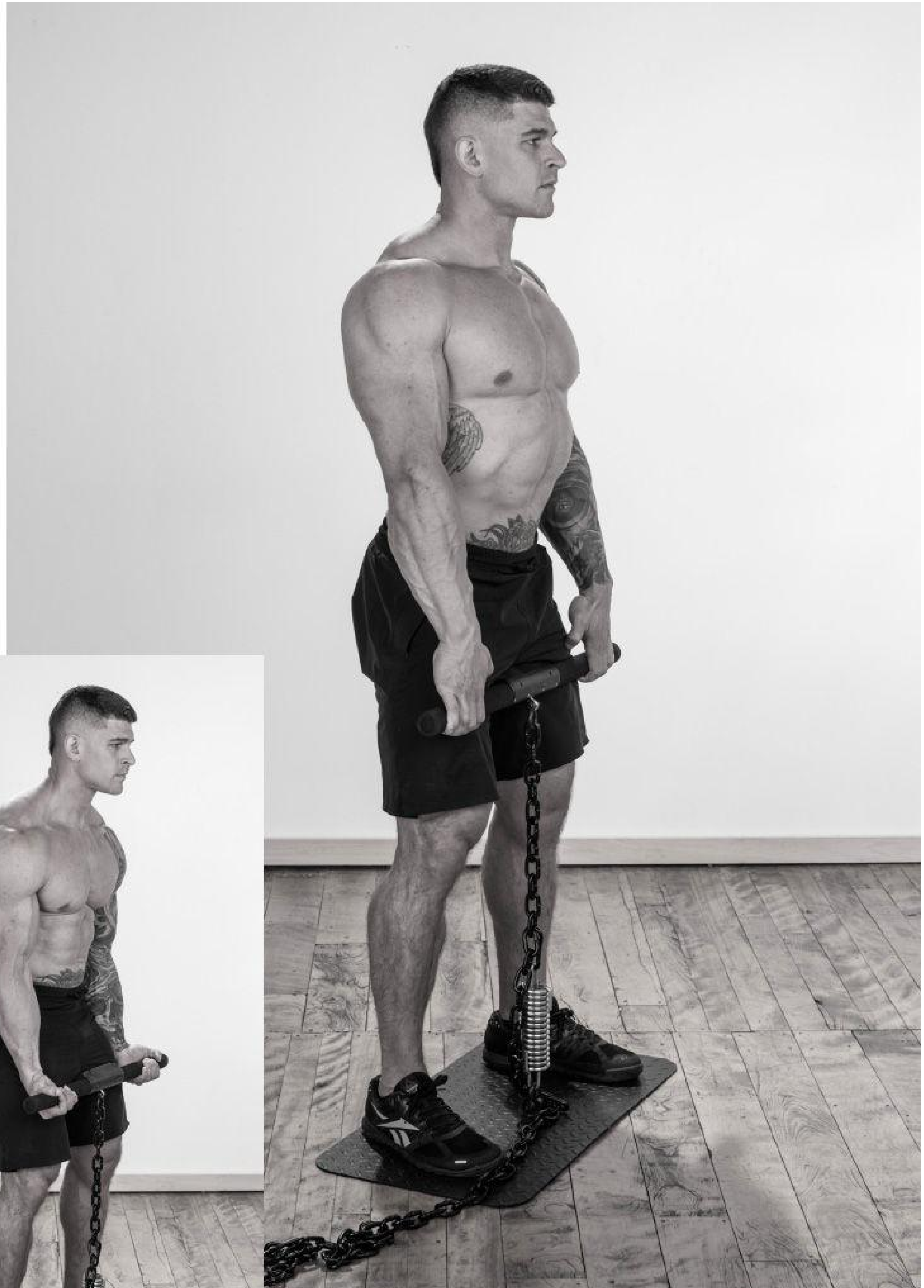
MUSCLES RECRUITED:

Gluteal muscles, spinal erectors, biceps femoris, quadriceps, latissimus dorsi, upper back complex, trapezius, abdominals, biceps.

ANATOMICAL CHART



FINGER HOLD



VARIATION: Wrist curl

ISOCHAIN HANDLE LEVEL: Finger level (arms down)

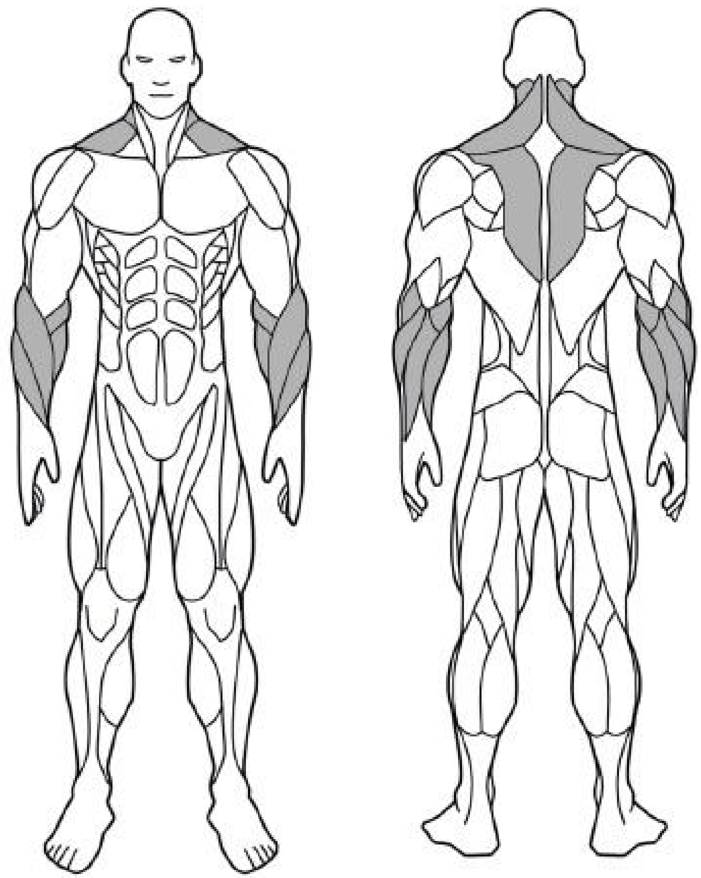
PERFORMANCE: Stand securely on the baseplate. With your arms hanging straight down in front of you, hold the handle in your fingers, palms facing you, and with your hands open. Pull up with the fingers in an attempt to roll the bar further into your hands. Breathe naturally throughout the exercise.

MASTER CUES:

- The key to this exercise is finding the correct handle level; just enough to hold the bar in the fingers without being able to close the hands.
- Keep the shoulders square. Try not to shrug.
- Keep the arms as straight as possible; pull the bar with the grip muscles, not the biceps.

MUSCLES RECRUITED: *Grip muscles, some trapezius and upper back.*

ANATOMICAL CHART



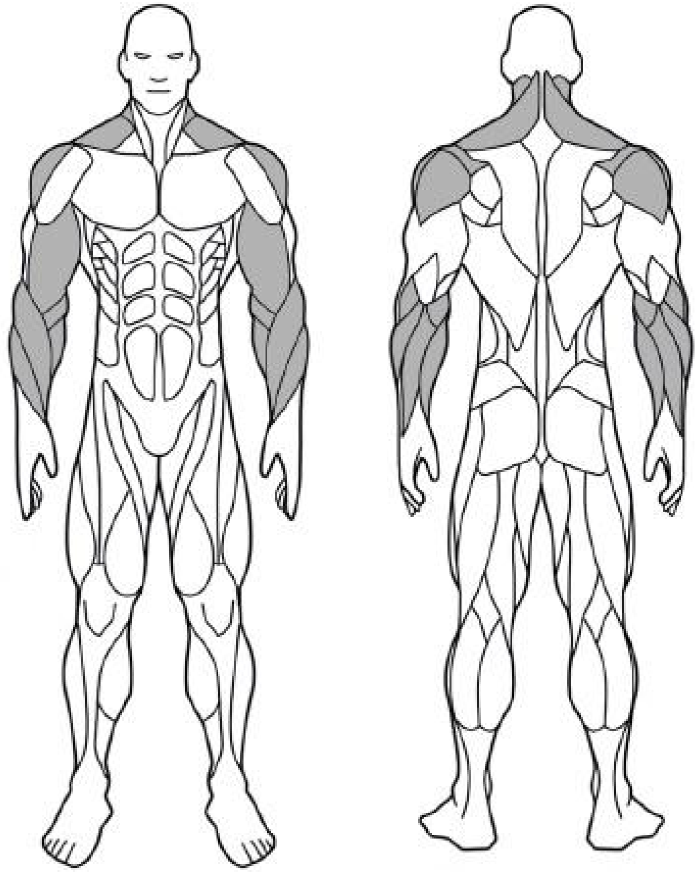
UPRIGHT ROW

TOP POSITION

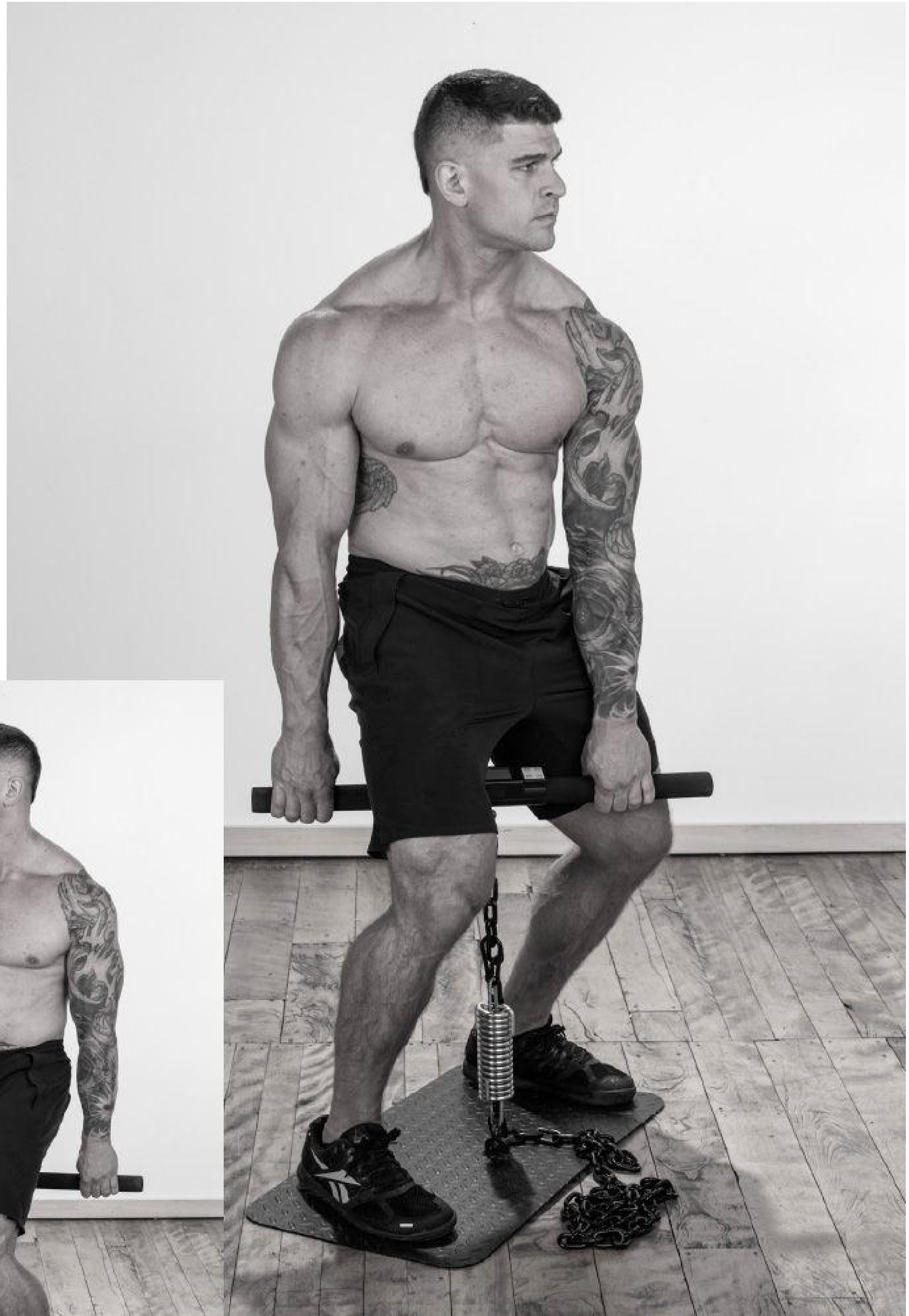
BOTTOM POSITION

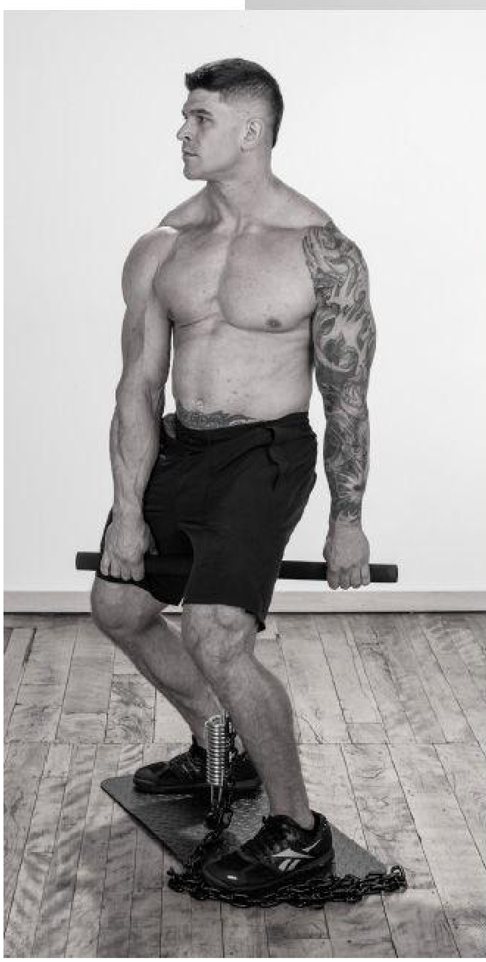
ISOCHAIN HANDLE LEVEL:	Navel to upper-chest
PERFORMANCE:	Stand securely on the baseplate. Squeeze the handle with a close overhand grip, with thumbs around the bar. Pull smoothly at the handle by raising your elbows as high as they will go. The shoulders should be allowed to rise, to further engage the shoulder girdle. Keeping your back upright, pull upwards against the handle. Breathe naturally throughout the exercise.
MASTER CUES:	• Do not lean back. This is not a back exercise. • Keep your elbows as high as possible. • Keep the handle close to your trunk.
MUSCLES RECRUITED:	*Lateral deltoids, trapezius, posterior deltoids, some upper-back complex (rhomboids, teres, trapezius, etc.), grip muscles.*

ANATOMICAL CHART



STRADDLE LIFT

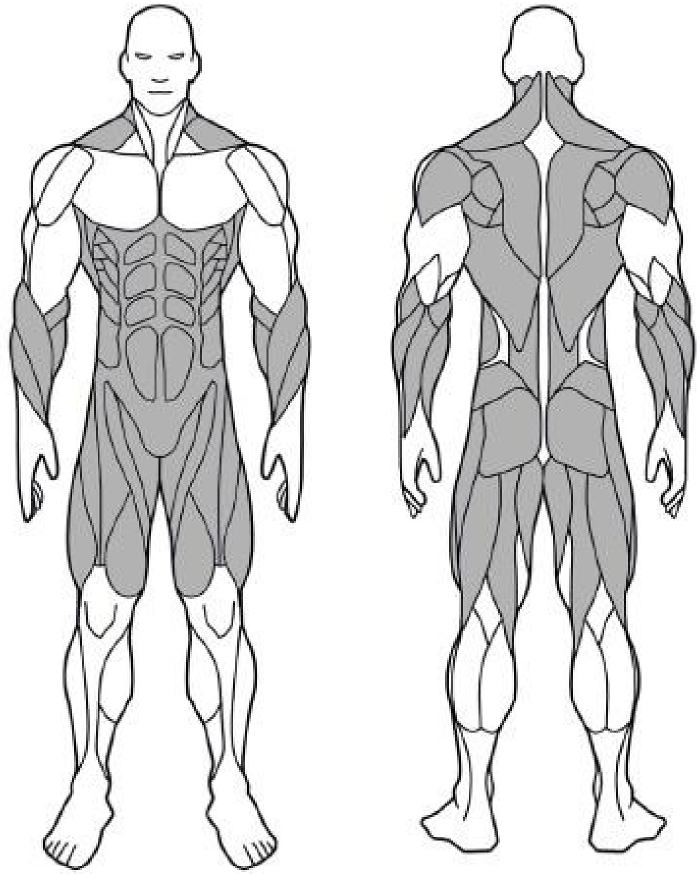




Reverse stance

ISOCHAIN HANDLE LEVEL:	Lower thigh to knee
PERFORMANCE:	Stand securely on the baseplate, facing away from the display unit. Squat down and thread the handle between your legs, holding it with an overhand grip at both ends. Keeping the arms straight, pull up against the handle by pressing though the legs. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep your trunk vertical. • Maintain a flat back, and look forward. • Push through the entire foot; avoid pushing through the toes.
MUSCLES RECRUITED:	*Quadriceps, gluteal muscles, spinal erectors, upper back complex, trapezius, biceps femoris, abdominals , grip muscles.*

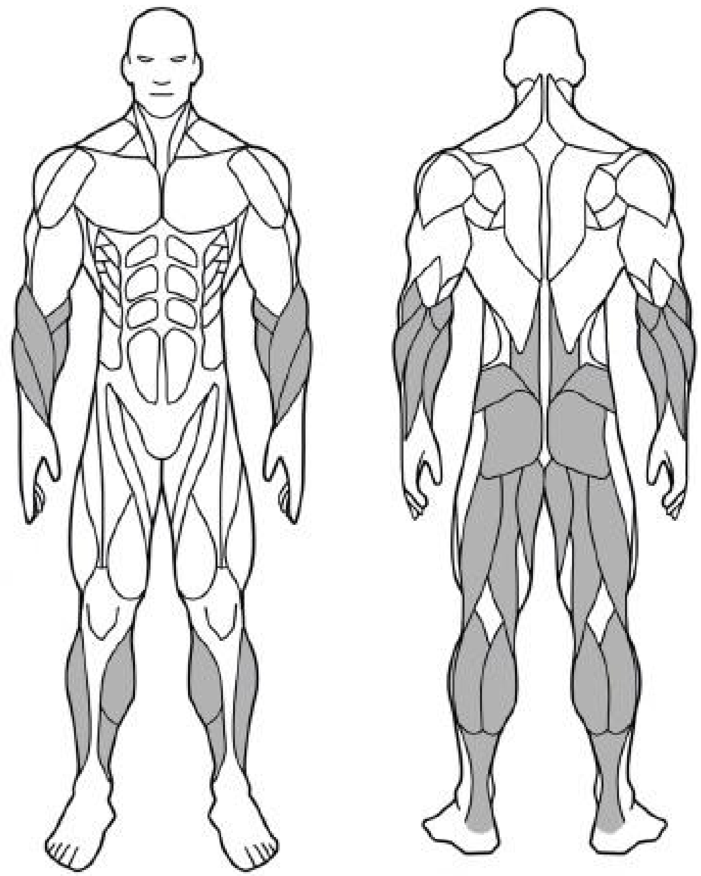
ANATOMICAL CHART



SINGLE-LEG DEADLIFT

ISOCHAIN HANDLE LEVEL:	Knee-level or below
PERFORMANCE:	Stand with your working leg on the center of the baseplate. Lean forward and squeeze the handle with an overhand grip, with thumbs around the bar. With the bar in front of your knee or shin, slowly raise your non-working leg. Once your balance is established, pull upwards against the handle. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep the back naturally flat; do not allow the spine to round. • Maintain some bend in the knee of the working leg. • Try to keep the non-working leg straight.
MUSCLES RECRUITED:	*Biceps femoris, gluteal muscles, spinal erectors, gastrocnemius and soleus (calves), ankle complex, plantar muscles, grip.*

ANATOMICAL
CHART

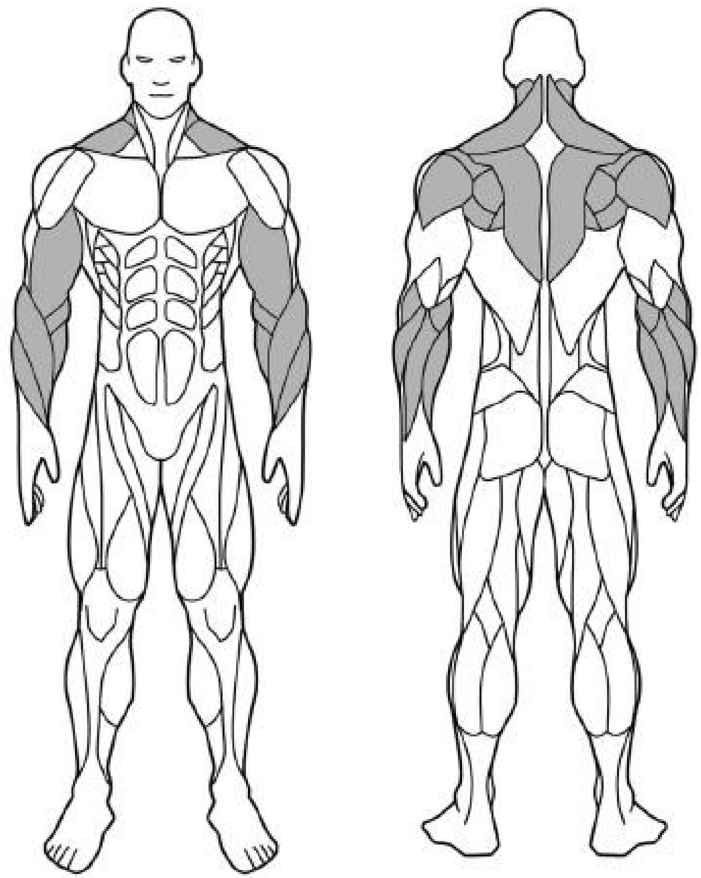


DRAG CURL

VARIATION: Reverse grip

ISOCHAIN HANDLE LEVEL:	Elbow height (arms down)
PERFORMANCE:	Stand securely on the baseplate. Squeeze the handle with an underhand grip, with thumbs around the bar. Pull your elbows as far back as they will go, allowing the handle to make contact with your torso. Keeping your elbows drawn back, push upwards against the handle. Breathe naturally throughout the exercise.
MASTER CUES:	• Do not permit the elbows to drift forward. • Keep the shoulders square, not pulled up or back. • Keep the wrists straight.
MUSCLES RECRUITED:	*Biceps (targets outer head), brachioradialis, brachialis, forearm flexors, upper-back complex, trapezius, grip muscles.*

ANATOMICAL
CHART



ZERCHER SQUAT

ISOCHAIN HANDLE LEVEL:	***Top:***	Upper abdomen
	Middle:	Abdomen
	Bottom:	Hip

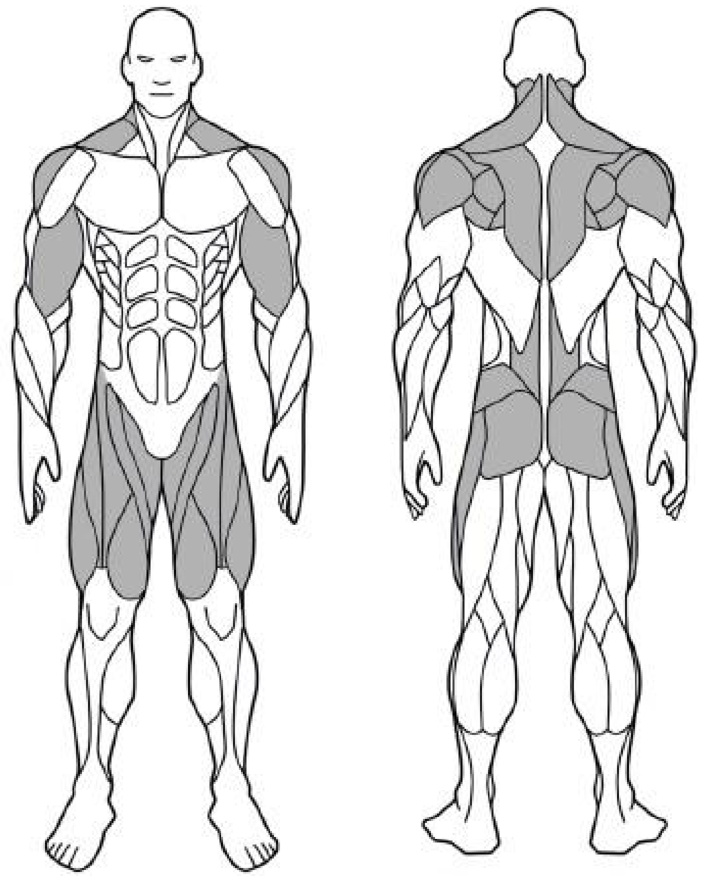
PERFORMANCE: Stand securely on the baseplate. Squat down until your inner elbows are under the handle. You can hold your hands together if this feels comfortable. Keep the back upright, and smoothly pull the handle upwards with leg strength. Breathe naturally throughout the exercise.

MASTER CUES:

- Keep the back upright—this is a *squat*, not a *deadlift* (see page 174).
- Brace the stomach muscles for added protection.
- Look forward, not down at the handle.

MUSCLES RECRUITED: *Quadriceps, gluteal muscles, spinal erectors, biceps, trapezius.*

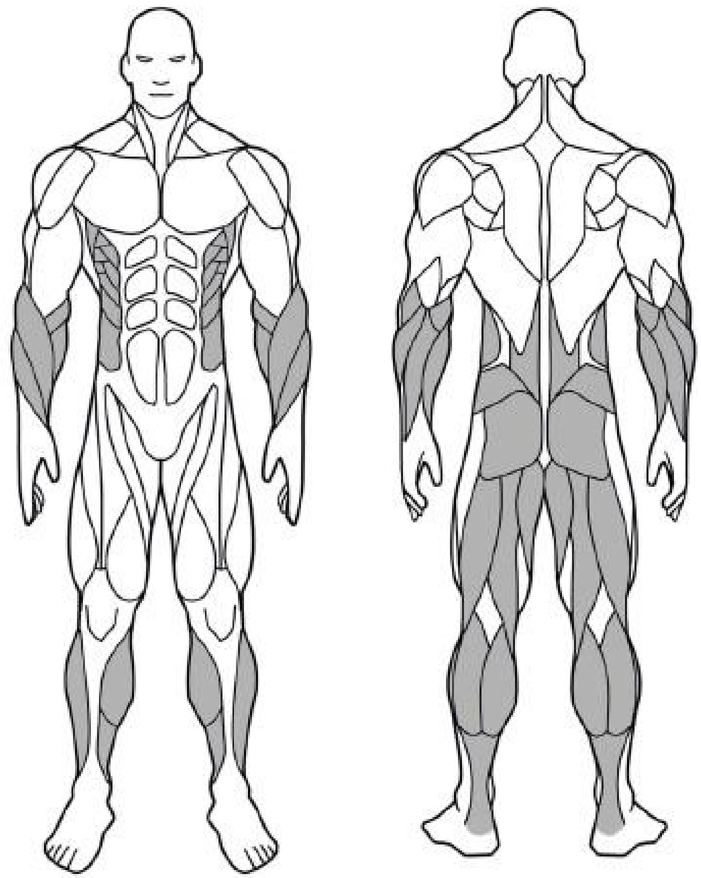
ANATOMICAL CHART



LATERAL SINGLE-LEG DEADLIFT

ISOCHAIN HANDLE LEVEL:	Knee-level or below
PERFORMANCE:	Turn your front foot so the outer side of the foot is forward. With the bar to the outside of your calf, twist towards the bar and pull the bar up. Keep your front leg kinked, and the other leg straight out behind you. Keep the arms straight and breathe naturally throughout the exercise. An opposite multi-axis drill can be performed with the inner part of the foot forward.
MASTER CUES:	• Keep the back naturally flat; do not allow the spine to round. • Maintain some bend in the knee of the working leg. • Try to keep the non-working leg straight.
MUSCLES RECRUITED:	*Biceps femoris, gluteal muscles, spinal erectors, lateral obliques, gastrocnemius and soleus (calves), ankle complex, plantar muscles, grip.*

ANATOMICAL CHART



SEATED ROW

ISOCHAIN HANDLE LEVEL:	***Top:***	Knee to mid-thigh
	Middle:	Knee level
	Bottom:	Lower to mid-shin

PERFORMANCE:

Lie on the floor and press your feet against the baseplate, which should be vertical. Grasp the bar with an overhand grip, and pull hard, attempting to draw it into your torso. Breathe naturally throughout the exercise.

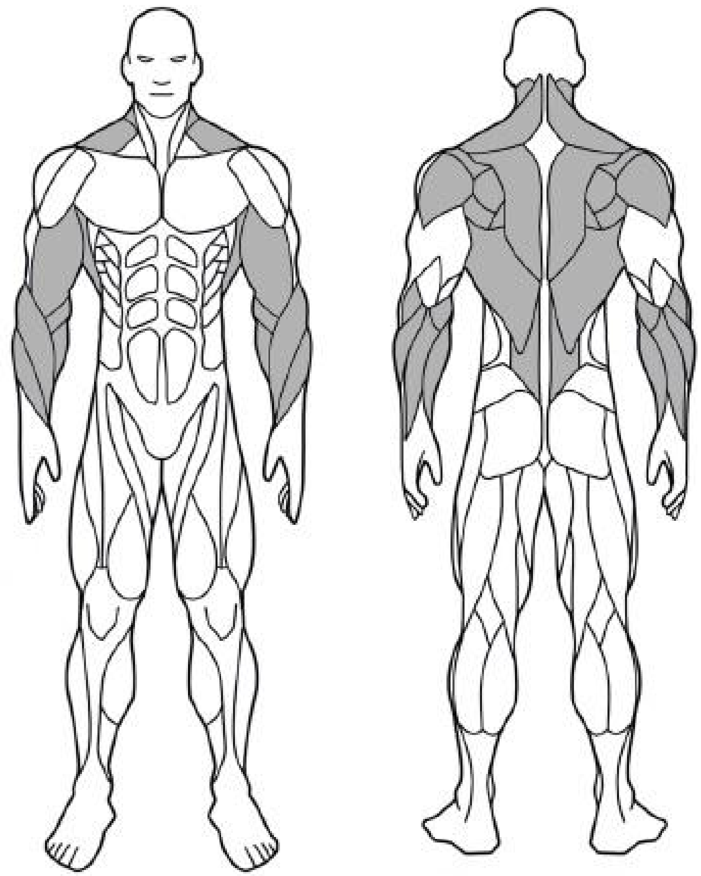
MASTER CUES:

- Keep the knees bent and the back flat. Do not allow the spine to round.
- Brace the stomach muscles for added protection.
- Keep the head up; look forward, not down.

MUSCLES RECRUITED:

Latissimus dorsi, upper back complex, biceps, trapezius, spinal muscles, forearm complex, grip muscles.

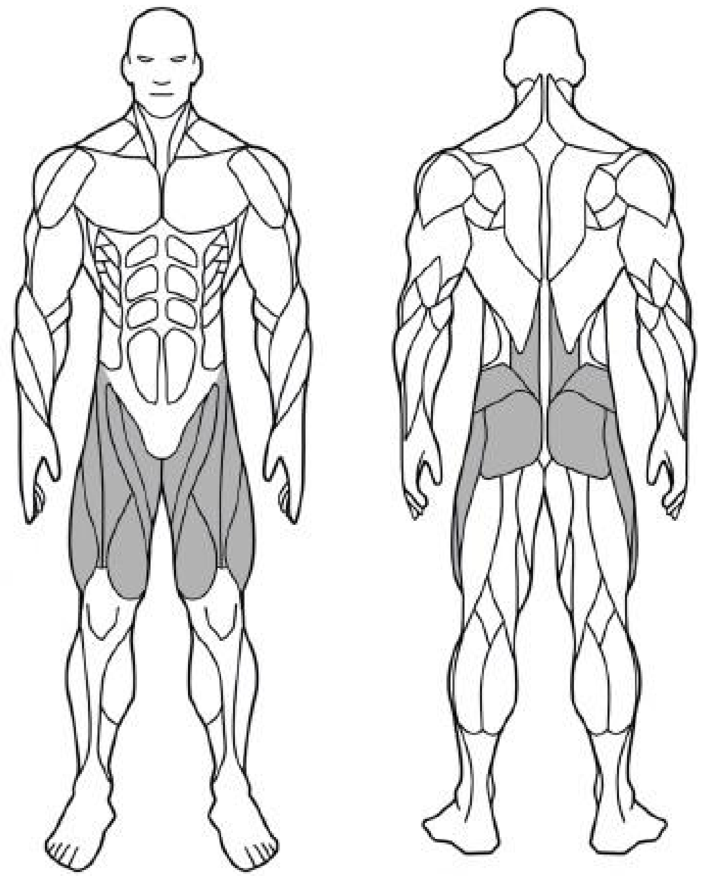
ANATOMICAL CHART



BULGARIAN SPLIT SQUAT

ISOCHAIN HANDLE LEVEL:	Solar plexus/upper-abdomen
PERFORMANCE:	Place one foot near the center of the baseplate, with the other foot stretched back behind you, instep resting on a stool or bench. Squat down into a lunge position, with the forward knee at a right-angle. Grip the handle, with the center of the bar on your upper chest and your elbows underneath and held away from your torso. Push upwards against the handle using leg power. Breathe naturally throughout the exercise.
MASTER CUES:	• Keep your back flat and your head up. • Try to keep your trunk as vertical as possible; avoid “bowing” forward. • Keep the rear leg well bent, but do not touch the knee to the floor.
MUSCLES RECRUITED:	*Quadriceps, gluteal muscles, spinal erectors.*

ANATOMICAL CHART



SEATED WRIST CURL

ISOCHAIN HANDLE LEVEL: Just above the knee

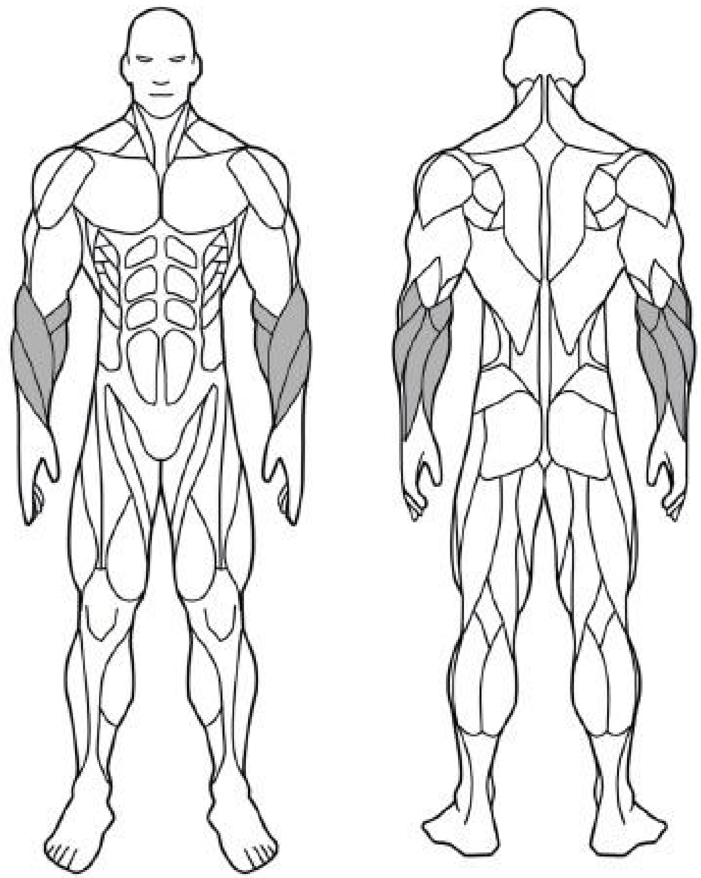
PERFORMANCE: Sit on the edge of a bench or stool, with both feet on the baseplate in front of you. With the bar just over your knees, bend forward and lay your forearms on your thighs. With an underhand grip, curl the bar upwards using wrist power. The wrists must be bent strongly to get a peak contraction. Breathe naturally throughout the exercise.

MASTER CUES:

- Keep the feet flat on the bench.
- Use the thighs as a secure "bench" for the forearms.
- Try to keep the biceps out of the exercise.

MUSCLES RECRUITED: *Forearm flexors, grip muscles.*

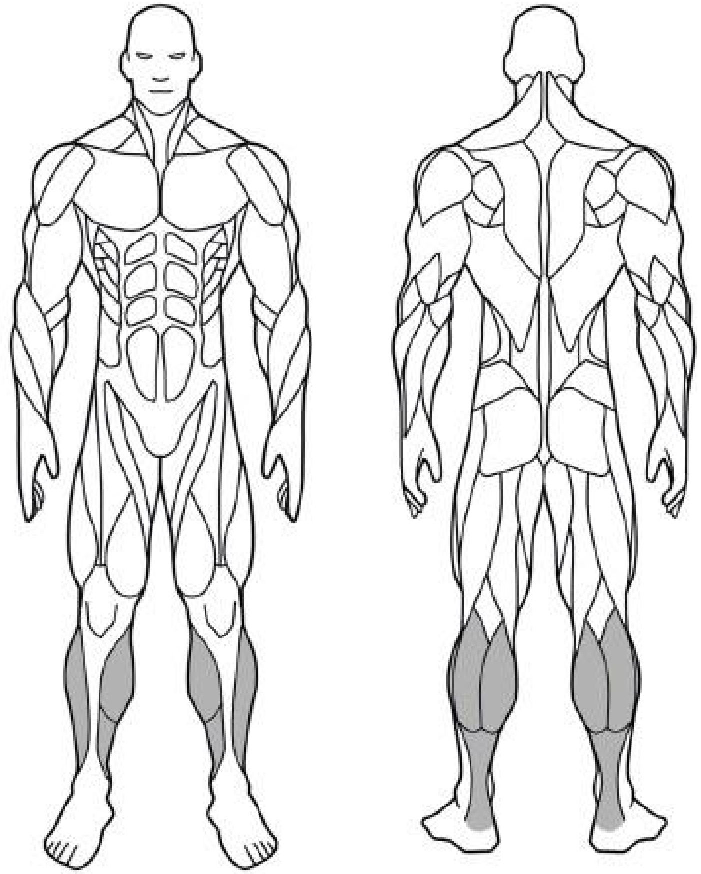
ANATOMICAL CHART



SEATED CALF RAISE

ISOCHAIN HANDLE LEVEL:	Just above the knee
PERFORMANCE:	Sit on the edge of a bench or stool, with both feet on the baseplate in front of you. Holding the bar with your hands resting on your knees, raise the heels into a seated calf raise, pressing hard against the handle with your knees. Breathe naturally throughout the exercise.
MASTER CUES:	• Finding the precise bar height is key to success in this drill. • Use the thighs as a secure “bench” for the forearms. • Pushing the heels as high as possible will increase the contraction.
MUSCLES RECRUITED:	*Gastrocnemius, soleus, ankle stabilizers.*

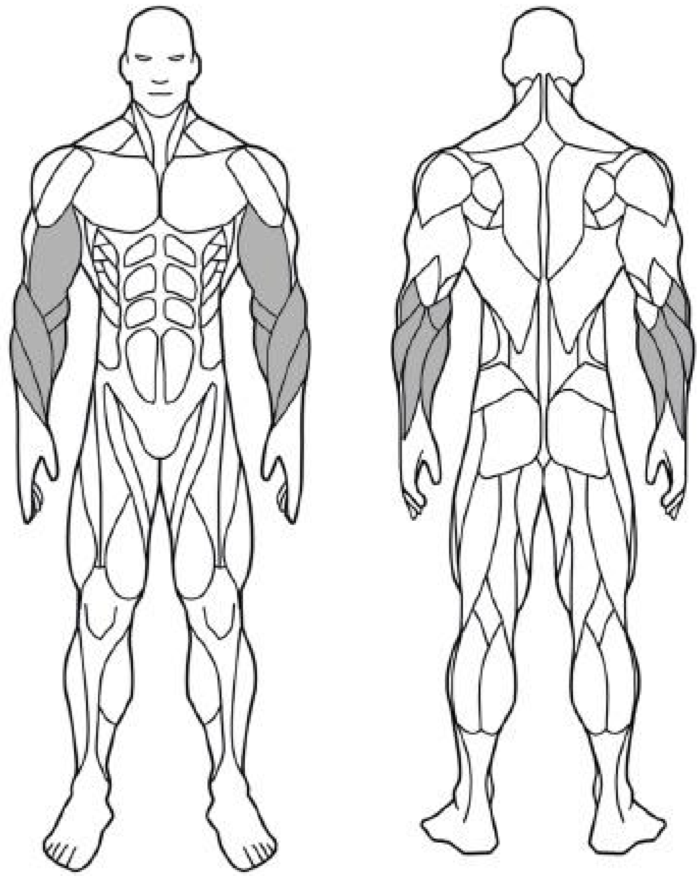
ANATOMICAL CHART



SEATED CURL

ISOCHAIN HANDLE LEVEL:	Upper-thigh to hip (while standing)
PERFORMANCE:	Sit on the edge of a bench or stool, with both feet on the baseplate in front of you. Grasp the bar with an underhand grip. With the bar at around stomach height, curl upwards. Keep the back upright and straight and look forwards. Breathe naturally throughout the exercise. Can also be performed with a reverse grip.
MASTER CUES:	• Keep the back vertical and neck upright. • Keep the elbows in close to your torso. • Keep the wrists locked straight. This is a biceps drill, not a forearm exercise.
MUSCLES RECRUITED:	*Biceps, brachialis, brachioradialis, forearm complex.*

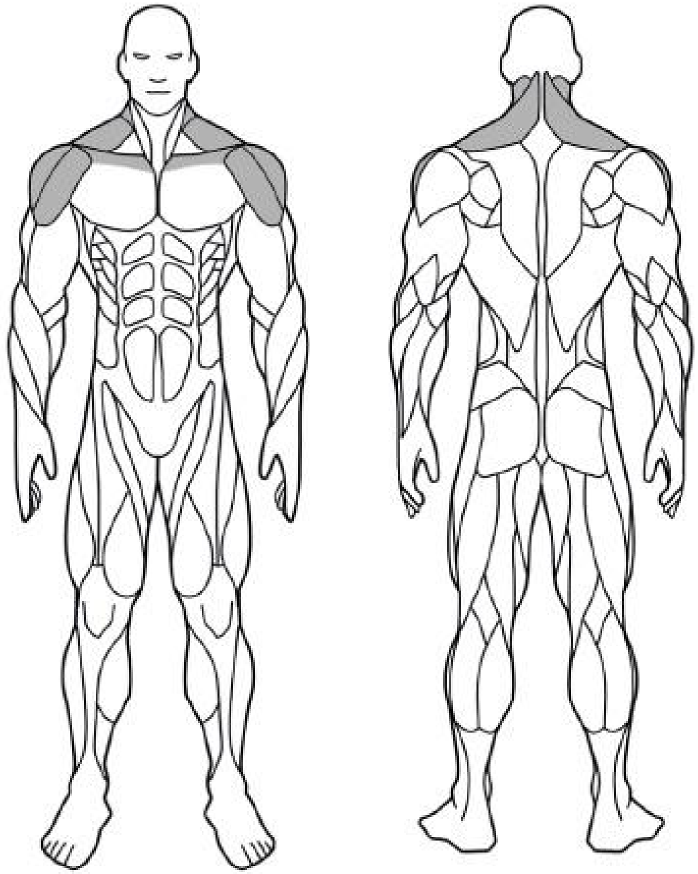
ANATOMICAL CHART



SEATED FRONT RAISE

ISOCHAIN HANDLE LEVEL:	Thighs to navel (while standing)
PERFORMANCE:	Sit on the edge of a bench or stool, with both feet on the baseplate in front of you. Grasp the bar in an overhand grip, and raise it to shoulder height. Keep the arms straight, and the back upright. Look forward. Breathe naturally throughout the exercise. Can also be performed with an underhand grip.
MASTER CUES:	• Keep the arms locked or slightly kinked. • Keep the trunk vertical; don't lean backwards. • Keep the shoulders square, resist the temptation to shrug them upwards.
MUSCLES RECRUITED:	*Anterior deltoid, lateral deltoid, trapezius.*

ANATOMICAL CHART



SEATED PRESS

ISOCHAIN HANDLE LEVEL:	***Top:***	Above head (while seated)
	Middle:	Forehead (while seated)
	Bottom:	Upper chest (while seated)

PERFORMANCE:

Sit on the edge of a bench or stool, with both feet on the baseplate in front of you. Grip the bar with an overhand grip and push upwards. Keep the back upright and look forward. Breathe naturally throughout the exercise.

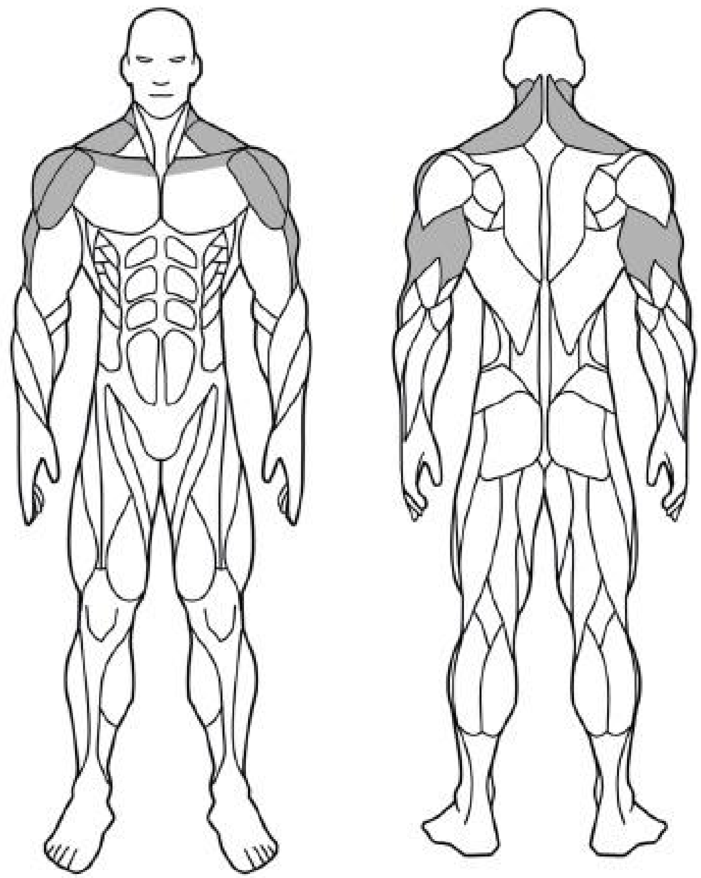
MASTER CUES:

- Do not force the elbows out to the sides; keep them in a natural position in front of you.
- Resist the urge to lean back; keep the trunk straight.
- Brace the stomach muscles for added protection.

MUSCLES RECRUITED:

Anterior deltoid, lateral deltoid, trapezius muscles, triceps.

ANATOMICAL CHART



SEATED SPIDER CURL

ISOCHAIN HANDLE LEVEL:	Mid-to-upper shin
PERFORMANCE:	Sit on the edge of a bench or stool, with both feet on the baseplate in front of you. With the bar at mid-to lower shin height, bend forward and curl the weight up. Keep the back rounded and neck in a neutral, safe position, with no stress. Breathe naturally throughout the exercise.
MASTER CUES:	• This is one exercise where you can round your spine somewhat. • Keeping the arms forward a little and away from the trunk will help isolate the biceps. • Keep the wrists locked straight. This is a biceps drill, not a forearm exercise.
MUSCLES RECRUITED:	*Biceps, forearm complex.*

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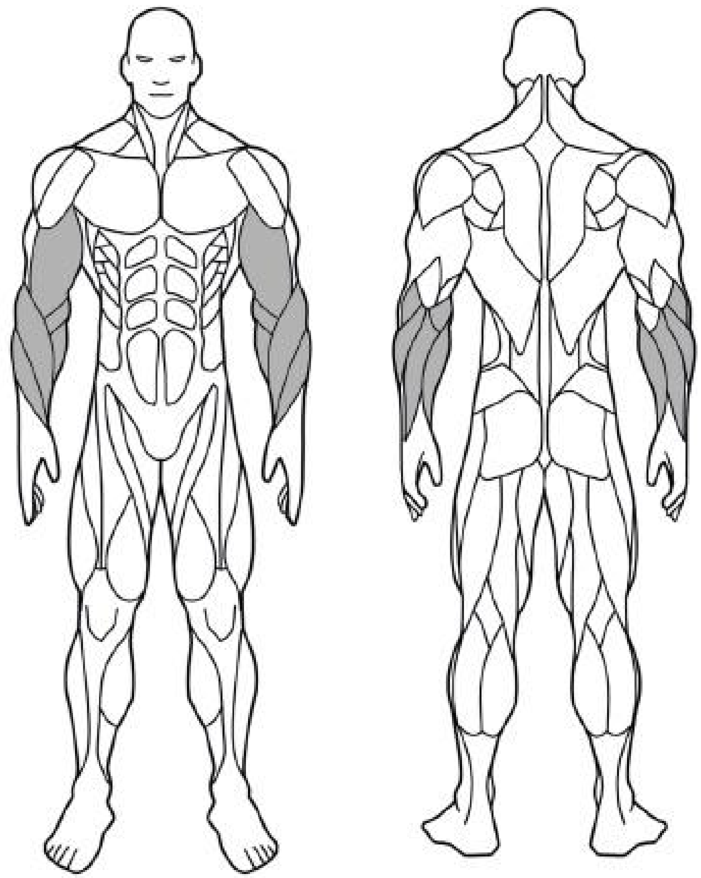
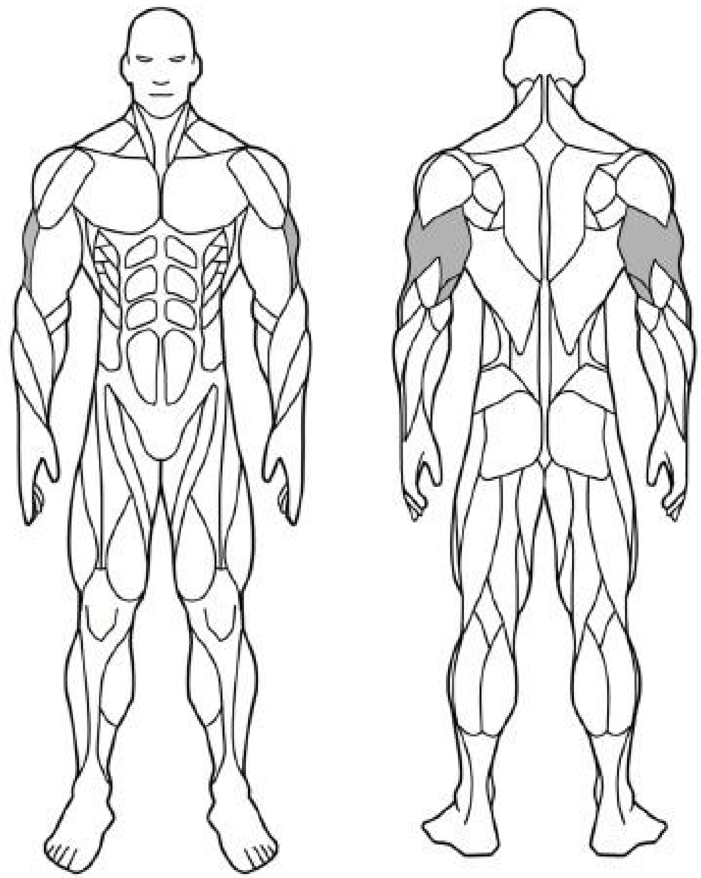


LYING TRICEPS EXTENSION

ISOCHAIN HANDLE LEVEL:	Upper thigh
PERFORMANCE:	Place two feet of the bench on the baseplate. Lie on the bench with your head towards the Isochain, and reach back to grab the handle, palms under the bar. Push up against the handle with the arms bent at approximately right-angles. Breathe naturally throughout the exercise.
MASTER CUES:	• Try to keep the elbows from splaying outwards. • Keep the head, trunk and hips in contact with the bench. • Keep the feet on the floor, and push through them to maintain stability.
MUSCLES RECRUITED:	*Triceps.*

ANATOMICAL CHART



LYING PULLOVER

ISOCHAIN HANDLE LEVEL: Upper thigh

PERFORMANCE: Place two feet of the bench on the baseplate. Lie on the bench, with your head towards the Isochain, and reach back to grab the handle, palms under the bar. Push up against the handle with straight (or slightly bent) arms. Breathe naturally throughout the exercise.

MASTER CUES:

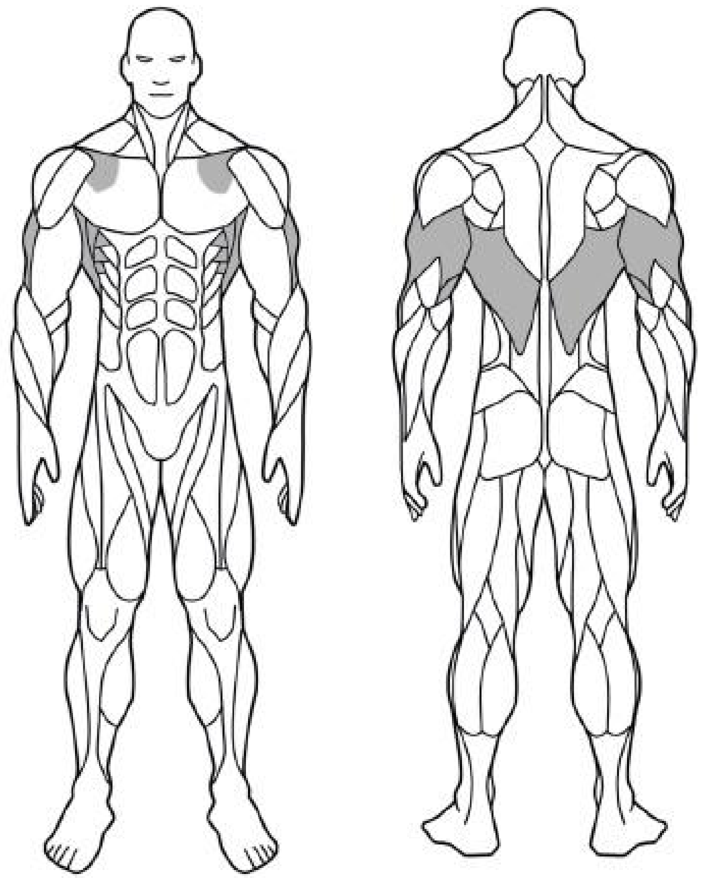
- Keep the back securely against the bench; no raising or arching.

- Secure the back of the head on the bench, to prevent neck strain.

- Keep the feet on the floor, and push through them to maintain stability.

MUSCLES RECRUITED: *Pec minor, triceps, latissimus dorsi, serratus*

ANATOMICAL CHART



UPPER BODY DRILLS

SHOULDERS/CHEST

Shoulder press	page 136
Chest press	page 144
Seated press	page 202
Shrug	page 146
Front raise	page 164
Clean pull	page 168
Upright row	page 178
Seated front raise	page 200

UPPER-BACK/LATS

Deadlift	page 134
Bent row	page 142
Shrug	page 146
Clean pull	page 168
Seated row	page 190

BICEPS

Biceps curl	page 138
Reverse curl	page 156
Drag curl	page 184
Seated curl	page 198
Seated spider curl	page 204
Zercher deadlift	page 174
Zercher squat	page 186

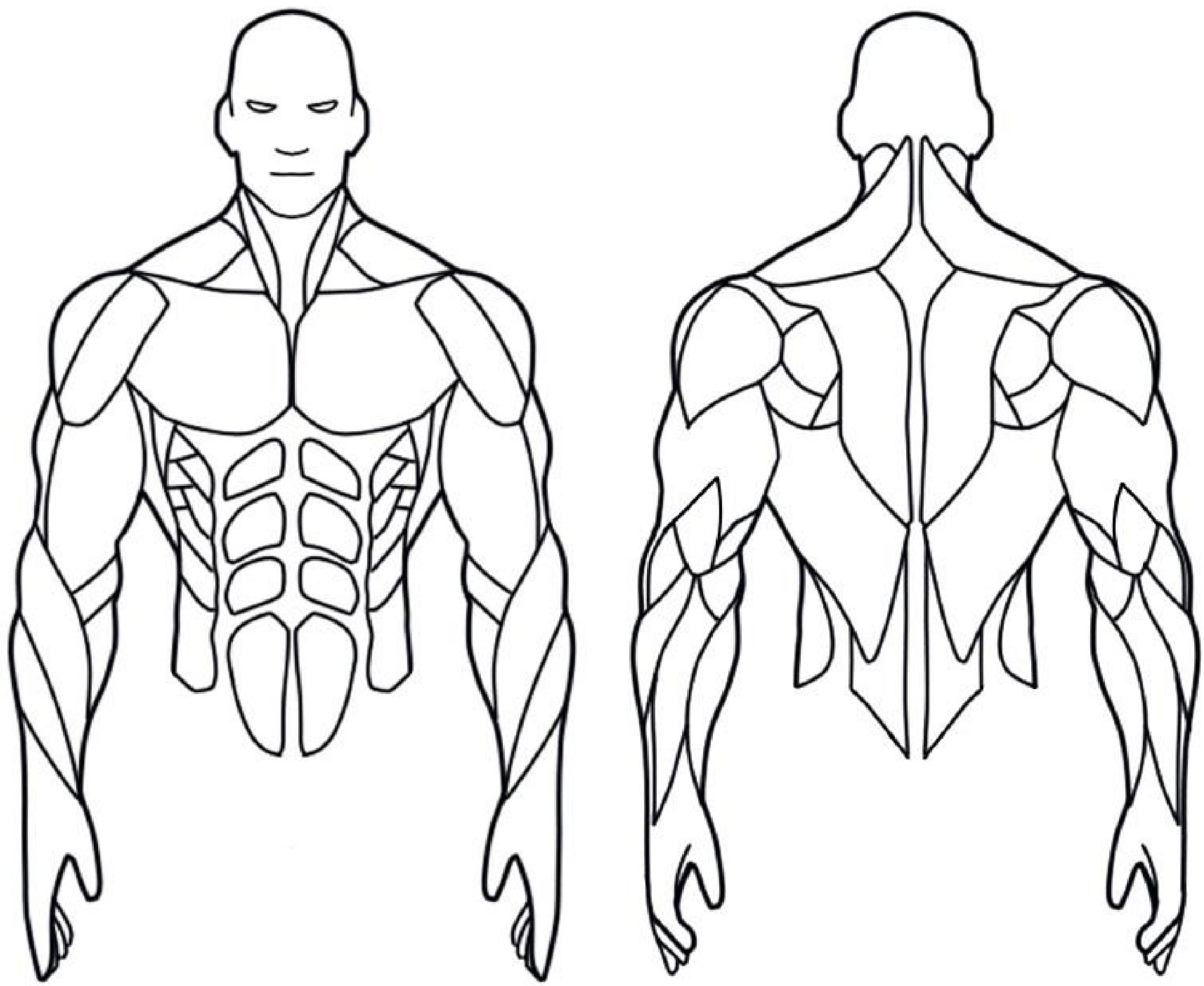
Any pulling exercise

TRICEPS

Triceps press page 148
Triceps kickback page 170
Lying triceps extension page 206
Lying pullover page 208
Any pressing exercise

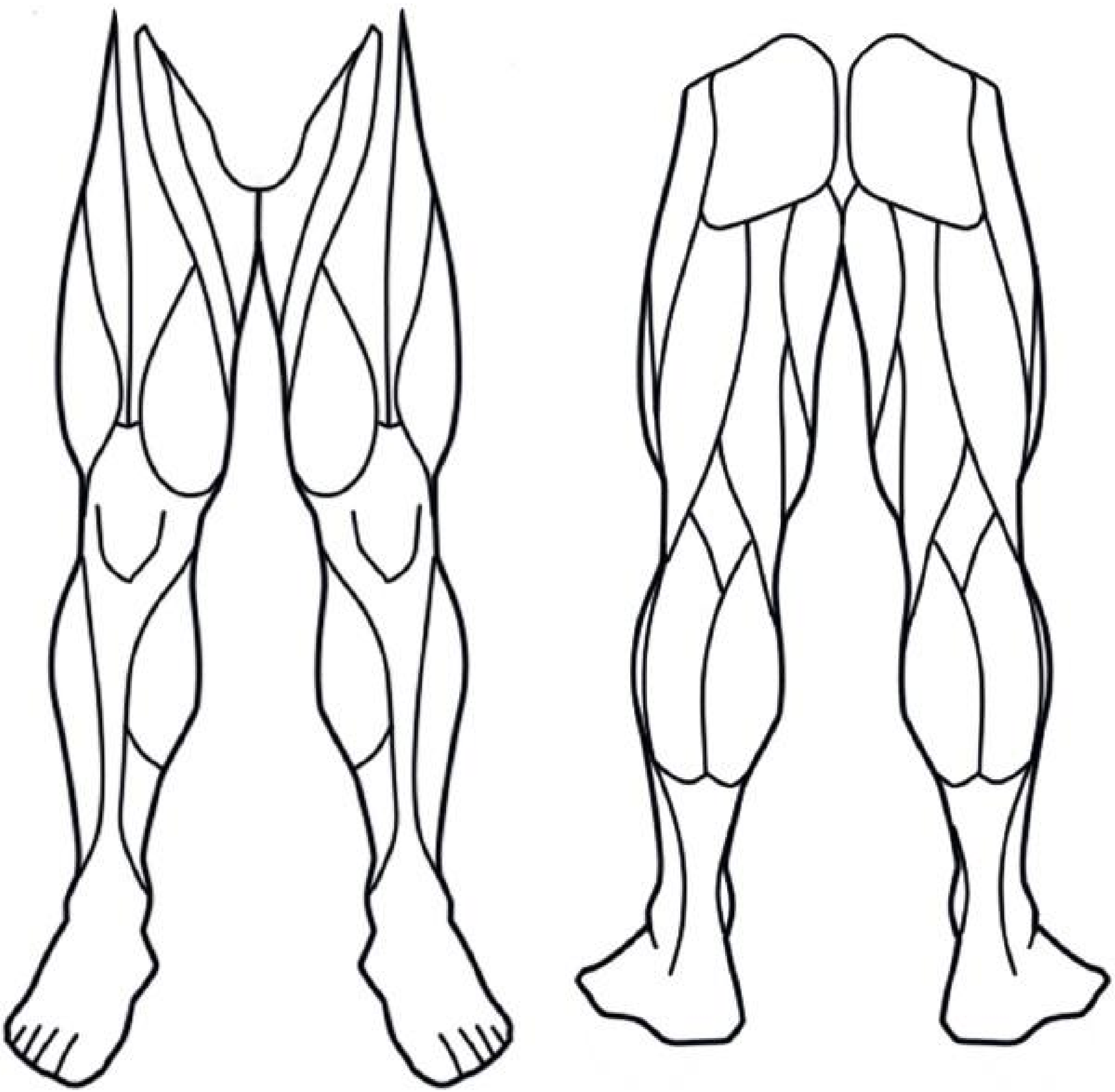
FOREARMS

Reverse curl page 156
Finger hold page 176
Seated wrist curl page 194
Any pulling exercise



LOWER BODY DRILLS

Lateral single-leg deadlift page 188
Seated calf raise page 196



In fact, I don't think you can win a championship without practicing isotension....It isn't enough to have big muscles, you have to be able to control them as well.

- Arnold Schwarzenegger, *The Encyclopedia of Modern Bodybuilding*[1]

13. Zero-Tech Isos

Static-State, Self-Resistance and Loadless Training

The Isochain was designed and constructed to be the ultimate isometric training device. It provides a "yielding" load, via the high strength spring; it's versatile in terms of training techniques; it has a small storage footprint; and perhaps most importantly, it records the user's force levels, allowing for feedback and progressive training. But what happens if it's time for an isometrics session, and you find yourself *without* this kind of advanced training equipment?

Fortunately, isometrics is the most accessible form of training that exists. This is one of the reasons it has remained popular over the centuries. Even without any special training equipment (or even basic weights), there are still *four* forms of isometric training permanently available to you:

1. ***Static-state training.*** This is where the athlete pushes of pulls against a completely immovable object—such as a doorway, a wall, or a column. This is perhaps the purest form of isometrics—once in the hold, there is no movement at all—but because the load is fixed, there is no engagement of the *loading reflex* so vital to building limit strength (see page 81 to 83). Because you can use everyday objects—typically, architectural features—this kind of training is convenient. Crucially however, there is no way to measure the forces you are

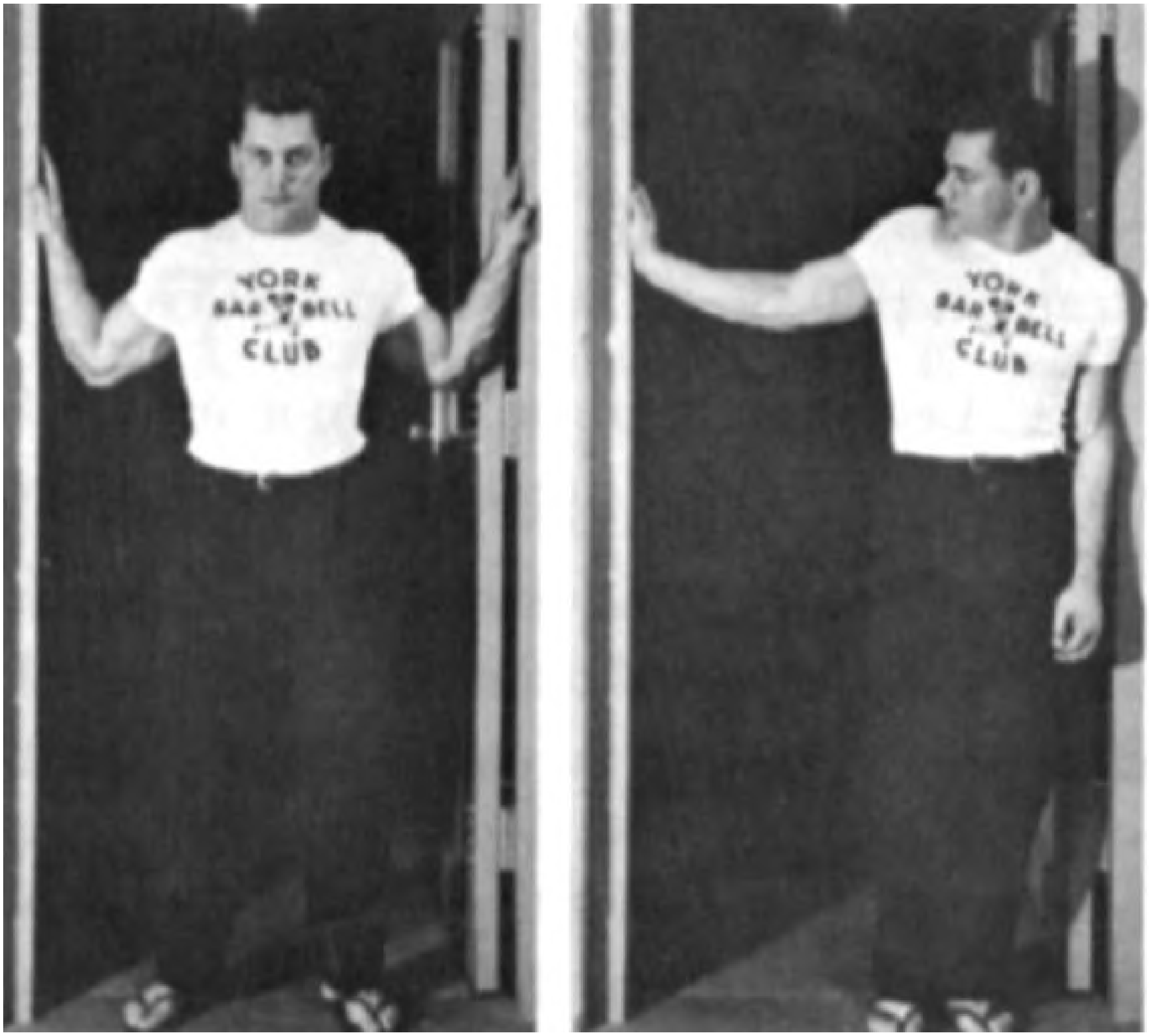
expressing during training.

2. ***Self-resistance training.*** This form of isometrics is performed when one limb (or group of muscles) generate a load, and another limb (or group of muscles) contracts against that load. An example might be forcefully pushing your hands together; even with no movement, *relatively* high levels of force can be generated. By definition, self-resistance training works multiple areas of the body at once; techniques are easy to perform, and can be expanded with everyday objects (such as a beach towel; you can also exploit your body's weight by lying, standing or sitting on the towel, to create *static-state* holds). Unfortunately, although a "live" load is used, the loading reflex is absent; there's no need for the nervous system to lift any strength limits because the load is regulated by the athlete's own brain—the brain can just downregulate load levels within a comfort zone. Again, this form of isometrics suffers from a lack of measurability.

3. ***Loadless training (sometimes called isotension).*** This approach involves static holds where the athlete tenses various muscles against their antagonist muscles. For example, when tensing the arm hard, the triceps and biceps are both pulling, so even when force levels are high, movement is zero. This is the kind of training seen in some traditional forms of martial arts, as well as posing in bodybuilding. It was also a favorite method of several early Soviet scientists (e.g., Voroboyev[2], Kovalik[3]). Loadless training has numerous benefits; it is perhaps the most convenient form of strength training imaginable; no equipment is required, and it can be performed anytime—in some cases, even without people around you knowing you're doing it. It can also work exceedingly well for athletes recovering from musculoskeletal injuries. Loadless training does not allow for measurability. The loading reflex is absent for the reason given with self-resistance training.

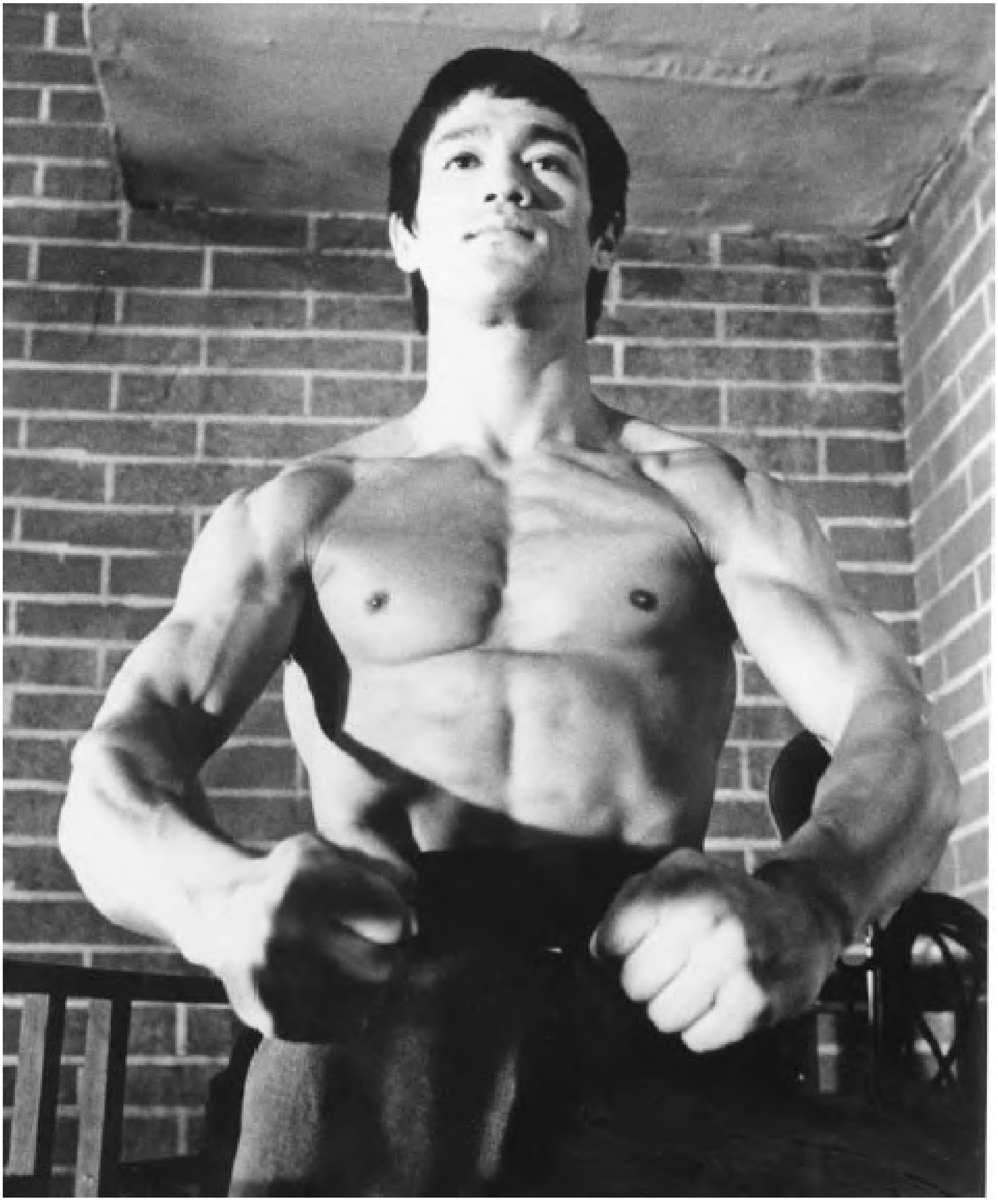
4. ***Bodyweight gravity isometrics.*** Rather than using immovable external objects (static-state isometrics), or the body's own muscles (self-resistance/loadless training), this form of isometrics involves

holding still under the body's own weight; gravity provides the force. This kind of isometric hold is typically seen in gymnastics (think of a handstand) or perhaps yoga. One major benefit of this group is that—because gravity is an external force—the loading reflex is present. While you cannot measure *forces* using this method, you can measure strength *progress* to some degree, as the athlete "levels up" in strength through the different progressions. On the downside, although this method can build ferocious strength in dedicated athletes, its techniques also typically require great balance and coordination, meaning it is less efficient as a form of resistance training. While still not requiring extensive equipment, some of these holds require a horizontal gymnastics bar (for example, front and back levers) or a vertical pole (the human flag). (We will not be discussing this category of isometrics in this chapter; it is comprehensively covered in *Part V* of the manual.)

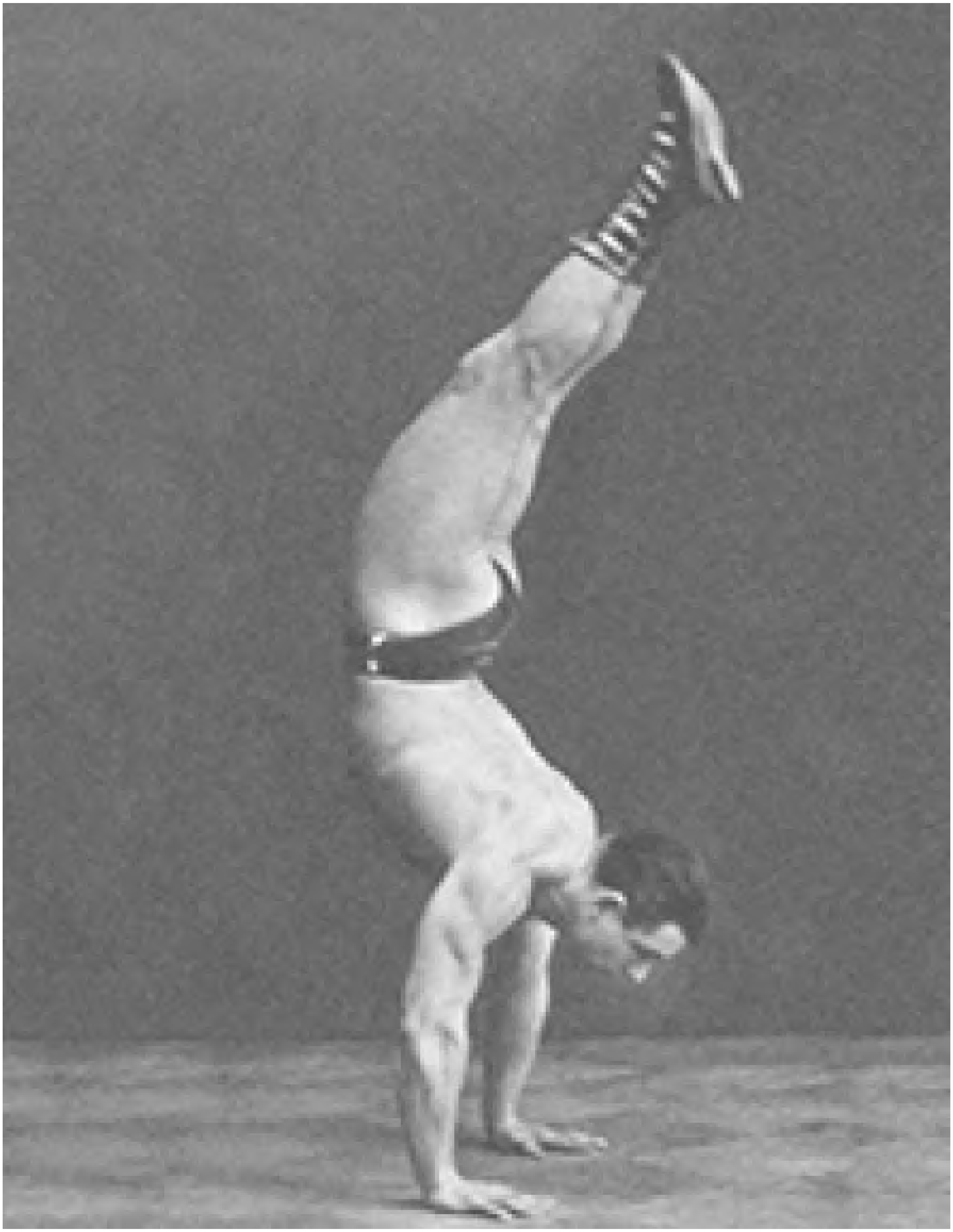


1. Static state isometrics Muscles vs immovable object

2. Self-resistance isometrics Limb-vs-limb



3. Loadless isometrics Agonist vs antagonist



4. Bodyweight isometrics Muscles vs gravity

It's fairly clear even from this brief analysis that the first three zero-tech methods of isometrics have their pitfalls. The loading reflex is absent, meaning the body cannot unlock its maximum voluntary strength; plus, there is no way for the athlete to measure the forces they are generating, to gauge their progress or for motivation. In addition—with a few exceptions—it is hard to find exercises in these approaches which work the legs optimally. For these reasons, zero-tech methods are provably inferior to utilizing the Isochain.

However—these methods do possess significant benefits. They are all time-tested (in some cases, over thousands of years) and have all been proven to increase strength. They have a positive impact on joints and soft tissues. They are all typically *low-skill* (compared to, say, gymnastic progressions), meaning that you can pick them up quickly and perform them on an ad hoc basis, with no period of re-learning required. They are also all highly convenient, adaptable, and of course they require no special equipment meaning they can be performed almost anywhere.

For these reasons, it's useful for athletes who regularly train with an Isochain to absorb some of these techniques into their training repertoire, as they can be highly practical and effective in various contexts. For example:

ZERO-TECH ISOS: VIABILITIES

- ✔ They can be used on vacation
- ✔ They can be used for variety
- ✔ They can be used during a layoff from Isochain work
- ✔ They can be added to existing Isochain programs
- ✔ They can be used as warm-up drills
- ✔ They can be used as prehab/rehabilitation exercises

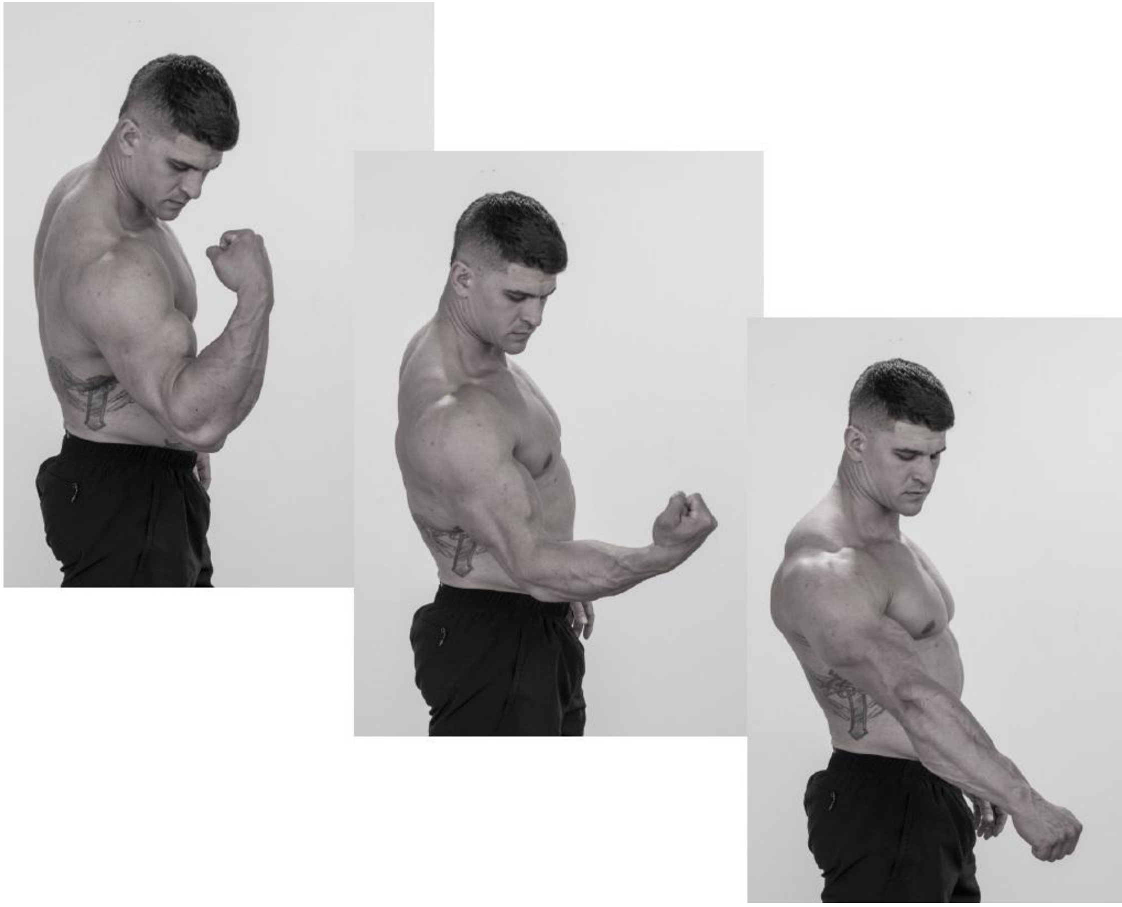
- ✔ They can be used for active recovery

Over the rest of this chapter, we will illustrate a selection of the best 60+ isometric holds from *static-state, self-resistance* and *loadless training* categories. Bear in mind that we are only showing fundamental exercises; there are a *huge* variety of these holds, as they can be performed from almost any position and any angle. You can even devise your own techniques. (If you utilize a lot of zero-tech training, don't forget to periodically measure your strength using an Isochain, to keep track of your progress.)

Maxick (1882-1961) developed his own form of loadless training called "maxalding", which later became known more simply as "muscle control". Loadless training is a very natural, effective way to keep the muscles healthy and well-circulated. This method is already programmed into our mammalian neurological "software"; when we yawn and stretch, we are actually contracting our muscles hard, to refresh them.

ISOMETRICS: EXPLOTING SHERRINGTON'S LAW OF RECIPROCAL INHIBITION

A useful practical tip. When approaching loadless (and in some cases, self-resistance) techniques, it's helpful to understand Sherrington's Law of Reciprocal Inhibition: *the closer any muscle is to full contraction, the less able its antagonist is to contract*. In practical terms, when you are targeting a particular muscle, hold the position closest to full contraction. For example, if you are performing loadless training and you wish to target the biceps, perform the hold with a strong bend at the elbow; when training the triceps, use a straight elbow; when training both muscles, bend the elbow halfway.



Images: Bent-arm—stronger biceps involvement
Midway bent-arm—50-50 biceps/triceps involvement
Straight-arm—stronger triceps involvement

PROGRAMMING ZERO-TECH TRAINING SESSIONS

- Due to the low-fatigue factor of the drills, total-body training sessions will work well.

- When training the entire body, pick at least seven exercises to target the large movers of the body:
  - Quads
  - Hamstrings/glutes

- Midsection
- Shoulders
- Chest
- Upper-back
- Lats

(The list on the opposite page will be useful for this.)

- If you have time for any further exercises, then you can add smaller muscles like biceps, triceps, neck, calves, grip, etc.

- You can mix and match different zero-tech methods; for example, you can perform static-state work for your chest and shoulders, self-resistance drills for you back, loadless training for your arm muscles, etc.

- Aim for 100% MVC (Maximal Voluntary Contraction) on each hold.[4]

- Due to the absence of the loading reflex, the “rise time” required to hit your MVC may take longer than with the spring-loaded Isochain. Give yourself a few seconds (6-9) to smoothly contract your muscles to their max.[5]

- Once you feel you’ve hit your MVC, hold that peak tension for 6-8 seconds.[6]

- Because zero-tech work is less demanding to the muscles than Isochain (or weighted) isometrics, you can rest less between holds: a mere 3-10 seconds is enough.[7]

- Perform 5 sets of each exercise.[8]

- As for any other isometric technique, do not hold your breath. Breathe freely.[9]

- If performing these sessions regularly, alternate-day (or

three x per week) sessions will work well.[10]

ZERO-TECH DRILLS BY BODY-PART

ZERO-TECH ISOS: PROGRAM TEMPLATES

5 DRILLS (A)

1. SR pull (high)	4 sets of 6-8 secs
2. Door horizontal press	4 sets of 6-8 secs
3. SR pull (middle)	4 sets of 6-8 secs
4. Door top press	4 sets of 6-8 secs
5. Wall squat	2 sets of 30 secs

A brief, simple focused workout. Excellent for beginners, vacationers, or those short on time.

5 DRILLS (B)

1. SR press (middle)	4 sets of 6-8 secs
2. Door horizontal row	4 sets of 6-8 secs
3. Door lateral raise	4 sets of 6-8 secs
4. SR abdominal press I	4 sets of 6-8 secs
5. SR thigh curl/press II	4 sets of 6-8 secs

Another example of a simple, convenient iso session. Brief but highly efficient.

7 DRILLS (A)

1. Door side press 5 sets of	6-8 secs
2. Door leg press 5 sets of	6-8 secs

3. Towel press II 5 sets of	6-8 secs
4. Door horizontal row	5 sets of 6-8 secs
5. SR abdominal press II	5 sets of 6-8 secs
6. Door calf raise 5 sets of	6-8 secs
7. SR arm curl/press 5 sets of	-8 secs

T*rains the entire body, with minimal drills.*

7 DRILLS (B)

1. Towel deadlift	5 sets of 6-8 secs
2. SR press (low)	5 sets of 6-8 secs
3. Back isotension	5 sets of 6-8 secs
4. Towel front raise	5 sets of 6-8 secs
5. Towel curl 5 sets of	6-8 secs
6. Towel French press	5 sets of 6-8 secs
7. Door rear neck press	5 sets of 6-8 secs

An excellent moderate-volume session.

10 DRILLS (A)

1. Towel leg press	5 sets of 6-8 secs
2. Towel press I	5 sets of 6-8 secs
3. Towel pull (high)	5 sets of 6-8 secs
4. Abdominal isotension	5 sets of 6-8 secs
5. Door glute-ham press	5 sets of 6-8 secs

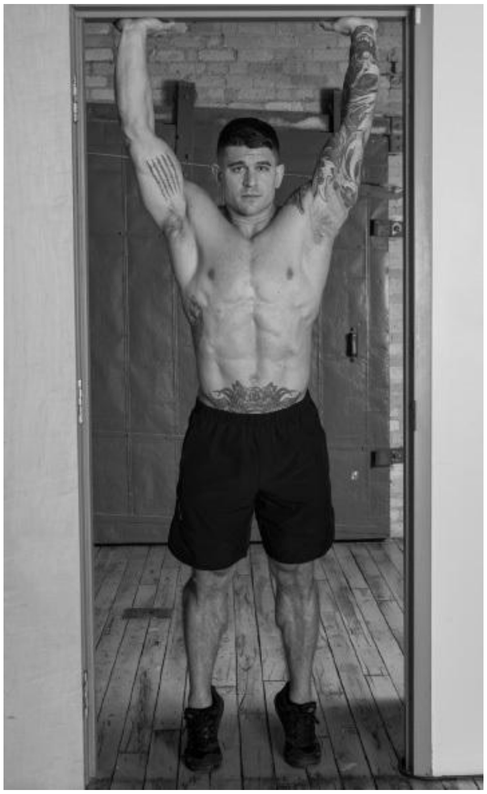
6. Door horizontal curl	5 sets of 6-8 secs
7. Calf isotension	5 sets of 6-8 reps
8. Back isotension	5 sets of 6-8 reps
9. Towel French press	5 sets of 6-8 reps
10. Door lateral raise	5 sets of 6-8 reps

A comprehensive total-body workout which hits large and small muscles well. Would suit advanced isometric athletes.

10 DRILLS (B)

A. SR press (upper)	5 sets of 6-8 secs
B. Lat isotension	5 sets of 6-8 secs
A. Towel deadlift	5 sets of 6-8 secs
B. SR abdominal press I	5 sets of 6-8 secs
A. SR rear press	5 sets of 6-8 secs
B. SR press (middle)	5 sets of 6-8 secs
A. Biceps isotension	5 sets of 6-8 reps
B. Triceps isotension	5 sets of 6-8 reps
A. SR neck press (rear)	5 sets of 6-8 reps
B. SR neck press (front)	5 sets of 6-8 reps

A "superset" workout; alternate sets for A and B, back-to-back with no rest between sets or exercises. Also an excellent cardio session.



DOOR TOP PRESS

Stand in a sturdy doorway, and place the palms on the upper frame. If you cannot reach the upper frame, stand on a box or stool, or on the toes. Brace the body. Once you are set, press hard upwards for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can also be performed unilaterally.

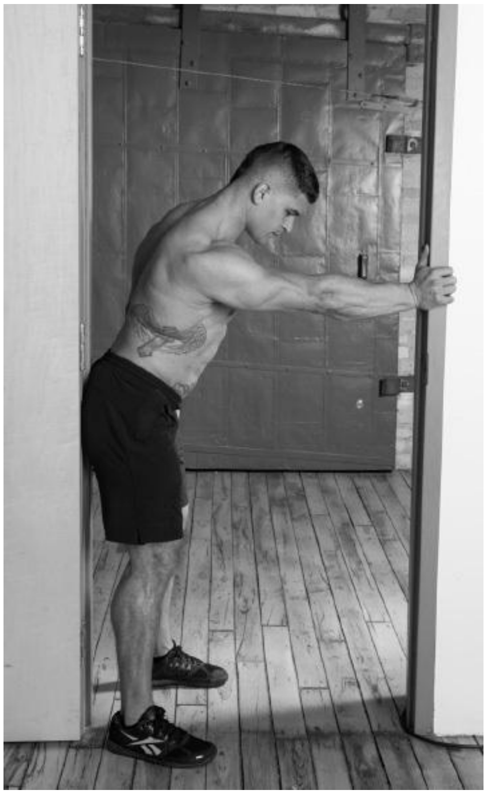
Muscles trained: *Shoulders, triceps*

DOOR SIDE PRESS

Stand in a sturdy doorway, and place the palms on the inner frames, around shoulder height. Brace the body. Once you are set, press hard sideways for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can also be performed unilaterally, by bracing one shoulder against the frame and pushing with the opposite arm.

Muscles trained: *Shoulders, triceps*

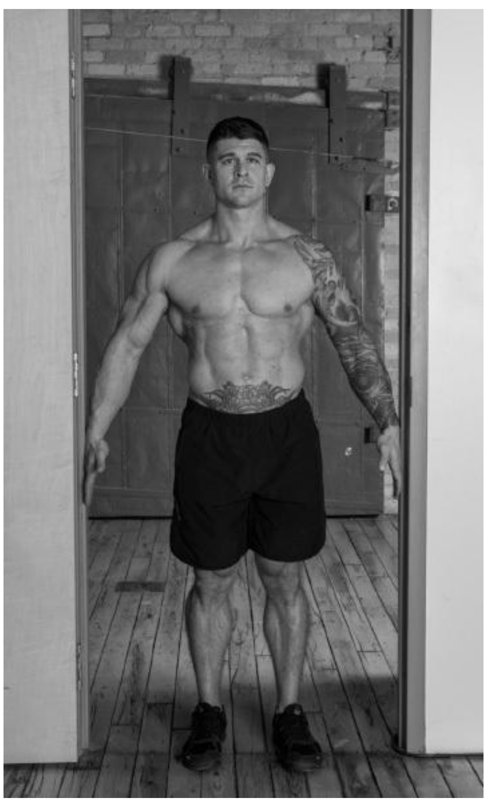


DOOR HORIZONTAL PRESS

Stand sideways in a sturdy doorway and lean forward, with your glutes supported by the inner frame. Place one palm on the opposite inner frame, at about chest height. Brace the body. Once you are set, press hard forwards for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can also be performed bilaterally.

Muscles trained: *Chest, shoulders, triceps, abdominals*



DOOR LATERAL RAISE

Stand in a sturdy doorway, and place the backs of the hands on the inner frames. Brace the body. Once you are set, press hard sideways for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can also be performed unilaterally, using the non-working hand to brace against the doorframe.

Muscles trained: *Shoulders*

DOOR HORIZONTAL ROW

Stand perpendicular to a sturdy doorway, and buttress your forearm against the wall. With your other hand, grip the inner doorframe. Brace the body. Once you are set, pull hard backwards for 6-8 seconds. Breathe naturally throughout the exercise.

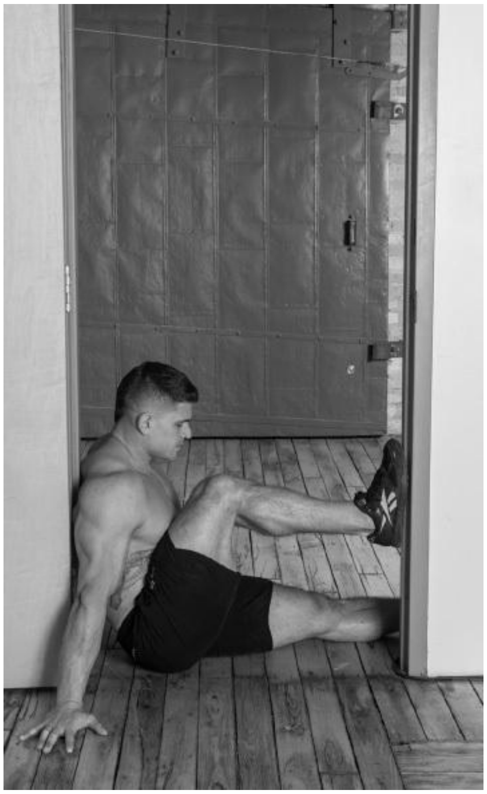
Muscles trained: *Upper back, biceps, grip*

DOOR HORIZONTAL CURL

Stand perpendicular to a sturdy doorway, and buttress your forearm or palm against the wall. Place your other palm behind the wall, with your arm approaching horizontal. Brace the body. Once you are set, pull hard backwards for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Biceps, upper back*

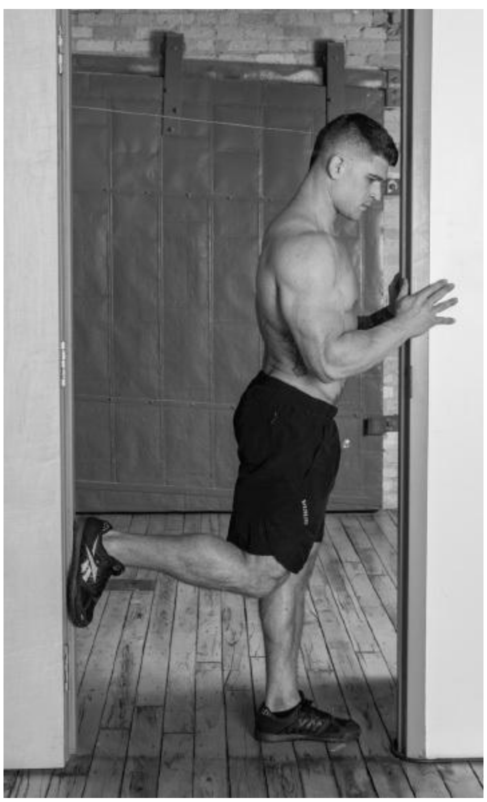
DOOR LEG PRESS



Sit sideways in a sturdy doorway, with your back supported by the inner frame. Press the sole of one foot against the opposite inner frame. Brace the body. Once you are set, press hard with the leg for 6-8 seconds. Breathe naturally throughout the exercise.

On some doorframes it will help to cushion your back with a pillow.

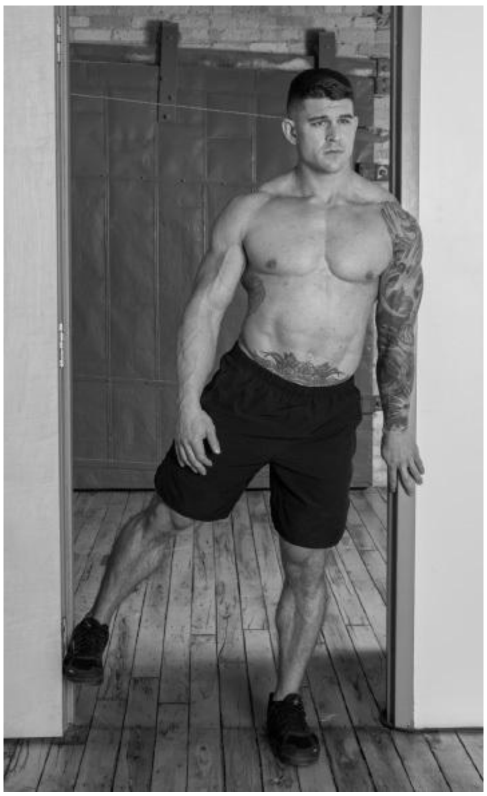
Muscles trained: *Quadriceps, glutes*



DOOR GLUTE-HAM PRESS

Stand sideways in a sturdy doorway, tightly gripping the inner frame. Press the sole of one foot against the opposite inner frame. Brace the body. Once you are set, press back hard with the leg for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Glutes, hamstrings*



DOOR LATERAL LEG RAISE

Stand sideways in a sturdy doorway, gripping the inner frame. Raise your opposite leg and press the side of your foot against the opposite inner frame. Brace the body. Once you are set, press outwards hard with the leg for 6-8 seconds. Breathe naturally throughout the exercise.

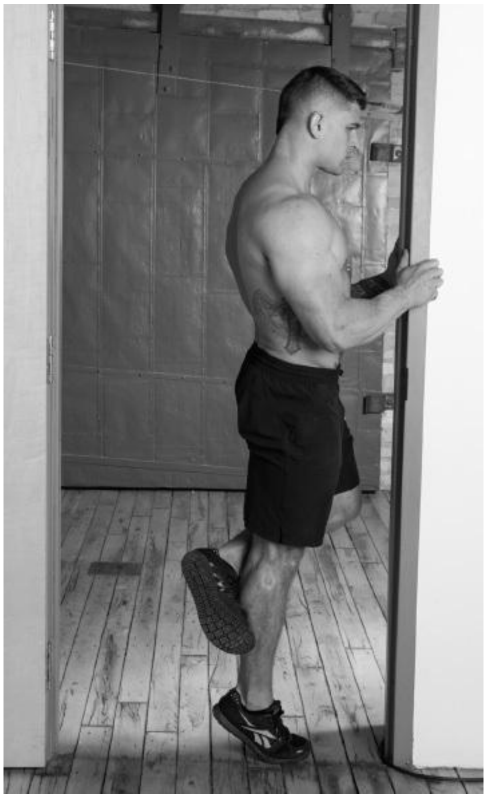
This exercise can also be performed with the leg pushing inwards, to work the antagonistic adductors.

Muscles trained: *Thigh abductors*

DOOR CALF RAISE

Stand sideways in a sturdy doorway, with your chest and abdomen supported by the inner frame. Grip the doorframe hard, pulling yourself down, and loop one foot around your ankle. Raise the heel of the loaded foot, pushing down hard with the toes for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can also be performed bilaterally.



Muscles trained: *Calves*

DOOR FRONT NECK PRESS

Stand sideways in a sturdy doorway, close to the inner frame. Grip the doorframe hard, pulling yourself into it, and press your forehead into the doorframe. Brace yourself. Once you are set, press the forehead forward for 6-8 seconds. Breathe naturally throughout the exercise.

Cushion your forehead with a folded towel. Avoid straining on any neck exercise.

Muscles trained: *Anterior neck*

DOOR REAR NECK PRESS

Stand sideways in a sturdy doorway, with your back towards the inner frame. Push forward against the opposite inner frame for support (using arms or one raised leg if the doorway is wide) and press your head back into the doorframe. Brace yourself. Once you are set, press the head backward for 6-8 seconds. Breathe naturally throughout the exercise.

Cushion your skull with a folded towel or pillow. Avoid straining on any neck exercise.

Muscles trained: *Posterior neck*

WALL SIT

Sit down with your back against a sturdy wall. Ideally, bend the knees to a 90-degree angle, and hold the position, with your arms away from the legs.

Technically this classic drill is a bodyweight gravity hold, but by trying to push backwards against the immovable wall as much as possible, it also veers into the static-state category of holds. Unlike the other gravity drills in Part V of this book, it's also hard to make the wall sit progressive, save by extending the hold period, or using only one leg (shown, below).

Building up to 5 sets of 60 seconds will provide for an amazing thigh workout. It can also be used as an inter-drill technique, to be performed for 30 seconds between different upper-body drills. You finish your door top presses, you perform a wall sit; you move on to door lateral raises, and when the reps are finished, you perform a wall sit; and so on.

This drill was known as "Samson's Seat" by the old-time strongmen.

Muscles trained: *Quads, glutes, hamstrings*

SR PRESS - HIGH

Hold your hands interlinked above your head. Brace yourself. Once you are set, press the hands together with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Shoulders, biceps*

SR PRESS - MIDDLE

Hold your hands interlinked in front of you. Brace yourself. Once you are set, press the hands together with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Chest, biceps*

SR PRESS - LOW

Hold your hands interlinked below your navel. Brace yourself. Once you are set, press the hands together with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Chest, biceps*

SR PULL - HIGH

Hold your hands in a “monkey grip” above your head. Brace yourself. Once you are set, pull the hands apart with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Lats, triceps, grip*

SR PULL - MIDDLE

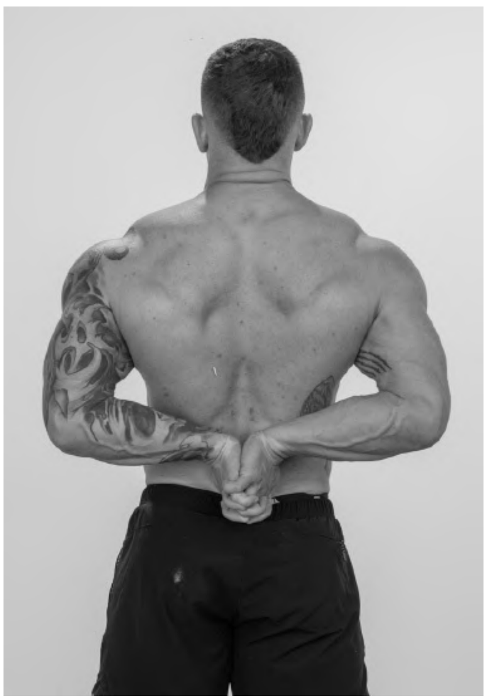
Hold your hands in a “monkey grip” in front of you. Brace yourself. Once you are set, pull the hands apart with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Upper back, triceps, grip*

SR PULL - LOW

Hold your hands in a "monkey grip" below your stomach (or behind your back). Brace yourself. Once you are set, pull the hands apart with maximum force for 6-8 seconds. Breathe naturally throughout the exercise. Can also be performed with the hands behind the back.

Muscles trained: *Traps, shoulders, triceps, grip*



SR REAR PRESS

Place your palms or fists together, behind your back. Your arms should be well bent. Brace yourself. Once you are set, press the palms or fists together as hard as you possibly can. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

A unilateral version can be performed with the hand on the hip. This variation might suit athletes with poor flexibility or shoulder issues.

Muscles trained: *Upper back, lats, biceps*

SR ARM CURL/PRESS

With your hands in front of your torso, place your palms together, with the top palm facing down and the lowest palm facing up. Brace yourself. Once you are set, press the hands together as hard as possible, trying to "curl" up with the lower palm, and "press" down with the upper palm. Hold for 6-8 seconds. Breathe naturally throughout the exercise. When the hold is completed, reverse arms and repeat.

Muscles trained: *Biceps (lower arm), triceps (upper arm)*

SR ABDOMINAL PRESS I

Bend forwards, placing the palms on the knees. Brace yourself. Once you are set, press down hard on the knees. Try to use mostly abdominal force, thinking of the arms only as struts to transmit that force. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Abdominals, hip flexors, chest, triceps*

SR ABDOMINAL PRESS II

Lie on the floor. Bring your knees up and bend forwards, placing the palms on the knees. Brace yourself. Once you are set, press forward on the knees. Try to use mostly abdominal force, thinking of the arms only as struts to transmit that force. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Abdominals, hip flexors, chest, triceps*

SR THIGH CURL/PRESS I

Lie supine on the floor. Raise your knees up above your hips, with the legs bent. Loop one ankle above the other, and brace yourself. Once you are set, push down hard with the top leg, while simultaneously pushing up hard with the lower leg. Hold for 6-8 seconds. Breathe naturally throughout the exercise. When the hold is completed, reverse legs and repeat.

Muscles trained: *Quadriceps (lower leg), hamstrings (upper leg)*

SR THIGH CURL/PRESS II

Lie prone on the floor. Bend your legs until the shins are approximately vertical. Loop one ankle behind the other, and brace yourself. Once you are set, push back hard with the front leg, while simultaneously pulling hard with the lower leg. Hold for 6-8 seconds. Breathe naturally throughout the exercise. When the hold is completed, reverse legs and repeat.

Muscles trained: *Hamstrings (rear leg), quadriceps (front leg)*

SR THIGH ADDUCTOR HOLD

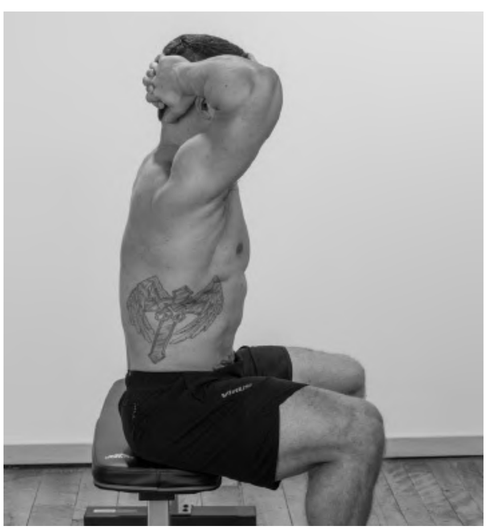
Seated in a chair or on the ground, place your knees about two fist-widths apart. Your knees should be bent. Place your palms on the insides of the knees, and brace yourself. Once you are set, push out hard against the knees, while simultaneously trying to close your legs together. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Thigh adductors, back, triceps*

SR THIGH ABDUCTOR HOLD

Seated in a chair or on the ground, place your knees about a fist-width apart. Your knees should be bent. Place your palms on the sides of the knees, and brace yourself. Once you are set, push in hard against the knees, while simultaneously trying to open out your legs. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Thigh abductors, chest, biceps*



SR NECK PRESS - REAR

Sit down with the back straight. Cup your hands behind your neck, and brace yourself. Once you are set, push your head back for 6-8 seconds. Breathe naturally throughout the hold. Avoid straining on any neck exercise.

Muscles trained: *Posterior neck*

SR NECK PRESS - FRONT

Sit down, and place your palms, fingers spread, on your forehead. Brace yourself. Once you are set, push your head forward for 6-8 seconds. Breathe naturally throughout the hold. Avoid straining on any neck exercise.

Muscles trained: *Anterior neck*

SR NECK PRESS - LATERAL

Sit down and place your palm against your temple. Brace yourself. Once you are set, push your head sideways for 6-8 seconds. Breathe naturally throughout the hold. Repeat on the opposite side. Avoid straining on any neck exercise.

Muscles trained: *Lateral neck*

TOWEL PRESS I

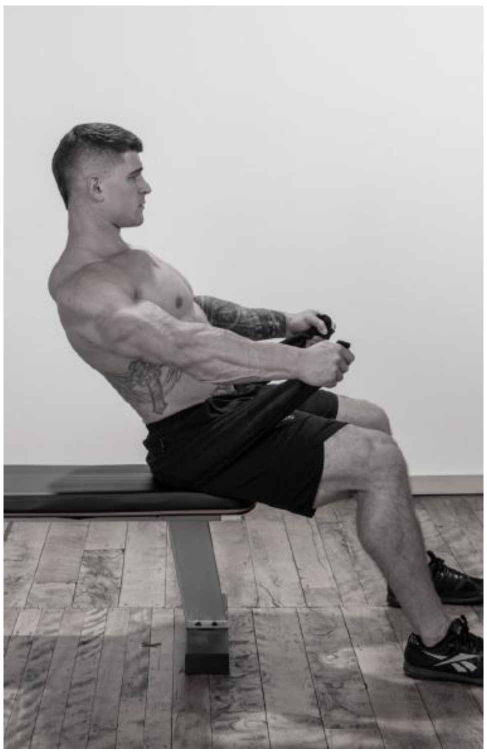
Stand up straight with the towel looped around the middle of your torso. Grasp the towel in an overhand grip, with your elbows bent and kept in tight to the body. Brace yourself. Once you are set, push upwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Shoulders, triceps*

TOWEL PRESS II

Lie on the floor with the towel looped underneath the middle of your torso. Grasp the towel in an overhand grip, with your elbows bent and kept in tight to the body. Keep your knees bent, with feet flat on the floor to stabilize yourself. Brace yourself. Once you are set, push upwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Chest, frontal shoulder, triceps*



TOWEL FRONT RAISE

Sit down with the towel looped around your upper legs. Grasp the towel in an overhand grip, with your arms straight and held out in front of you, either horizontally or diagonally. Brace yourself. Once you are set, push upwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Frontal shoulder, chest*

TOWEL ROW

Sit on the floor with your legs locked straight and extended in front of you. Loop the towel around your heels. Grasp the towel in a hammer grip, palms facing each other, with arms bent. Brace yourself. Once you are set, pull backwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Because the legs are so much stronger than the bent arms, the arms and back are

trained hardest.

Muscles trained: *Upper back, lats, biceps, grip*

TOWEL PULL - HIGH

Grip a towel wider than shoulder-width above your head. Brace yourself. Once you are set, pull the hands apart with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Lats, triceps, grip*

TOWEL PULL - MIDDLE

Grip a towel wider than shoulder-width in front of you. Brace yourself. Once you are set, pull the hands apart with maximum force for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Upper back, triceps, grip*

TOWEL PULL - LOW

Grip a towel wider than shoulder-width below your waist. Brace yourself. Once you are set, pull the hands apart with maximum force for 6-8 seconds. Breathe naturally throughout the exercise. Can also be performed with the towel behind your back.

Muscles trained: *Traps, shoulders, triceps, grip*

TOWEL FRENCH PRESS

Loop the towel around your upper back and through your armpits. Grasp the towel in a hammer grip, with your palms facing each other. Raise your upper arms as close to vertical as you can, with the elbows bent at right-angles. Brace yourself. Once you are set, push upwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can be performed seated or standing.

Muscles trained: *Triceps*

TOWEL CURL

Sit down with the towel looped around your upper legs. Grasp the towel in an underhand grip, palms facing up, with your arms bent and held out in tight to the torso. Brace yourself. Once you are set, push upwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

You hand also perform this exercise with a “hammer grip”, palms facing each other.

Muscles trained: *Biceps*

TOWEL DEADLIFT

Loop the towel beneath your feet. Bend over, grasping the towel in an overhand grip,

with your arms straight. Keep your back flat, and knees slightly bent. Brace yourself. Once you are set, pull upwards hard against the towel. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can also be performed unilaterally.

Muscles trained: *Hamstrings, glutes, spinal erectors, grip*

TOWEL LEG PRESS

Sit on the floor and bend one leg, bringing your knee up high. Loop the towel under your foot. Grasp the towel in a hammer grip, palms facing each other, with arms straight. Brace yourself. Once you are set, push out hard against the towel with your bent leg. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Quadriceps, glutes, grip, upper back.*

CHEST ISOTENSION

With the bent arms diagonally downwards and the fists and arms tensed,

brace yourself. Once you are set, contract the pectorals as hard as possible, stabilizing the movement with the back muscles. The fists do not need to touch. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise is similar to the *most muscular* (a.k.a. *the crab*) pose in bodybuilding.

Muscles trained: *Chest, lats, upperback, arms*

BACK ISOTENSION

With the bent elbows drawn horizontally backwards and the fists and arms tensed, brace yourself. Once you are set, contract the pectorals as hard as possible, stabilizing the movement with the chest muscles. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

The elbows do not need to go behind the body-line for maximum contraction to take place.

Muscles trained: *Upper-back, lats, chest, arms*

SHOULDER ISOTENSION

With the bent arms held overhead and the fists and arms tensed, brace yourself.

Once you are set, push the arms back and contract the deltoids as hard as possible, stabilizing the movement with the lat muscles. The fists do not need to touch. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Muscles trained: *Shoulders, traps, lats, upper-back, arms*

LAT ISOTENSION

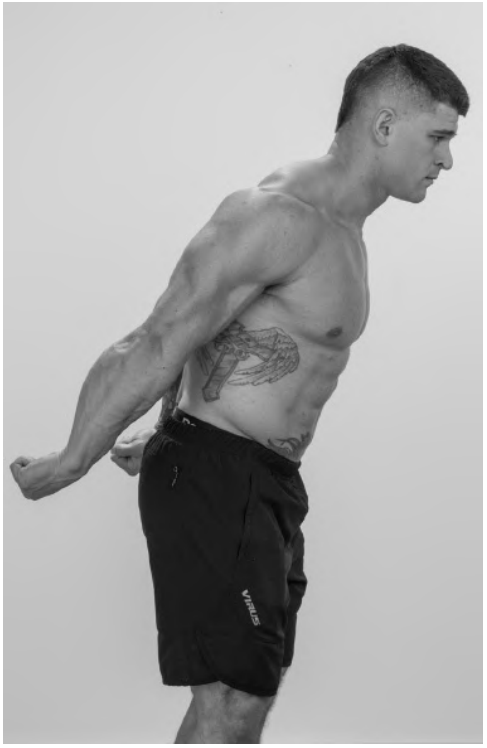
With the arms either side of your torso, spread the scapulae (shoulder-blades) as much as possible. Tense the arms and fists, and brace yourself. Once you are set, contract the lats as hard as possible, stabilizing the movement with the back and shoulder girdle. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise is similar to the *lat spread* pose in bodybuilding.

Muscles trained: *Lats, back, shoulders, arms*

TRICEPS ISOTENSION

Extend your locked arms slightly behind



your trunk, with the hands balled into fists. Brace yourself. Once you are set, contract the triceps as hard as possible, stabilizing the movement with the biceps muscles. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Squeezing the fists hard during upper-body isotension drills increases contraction through a neurological process known as *irradiation.*

Muscles trained: *Triceps, biceps*

BICEPS ISOTENSION

Lock your upper arms into position and bend the elbows at an acute angle. With the hands balled into fists, brace yourself. Once you are set, contract the biceps as hard as possible, stabilizing the movement with the triceps muscles. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

Squeezing the fists hard during upper-body isotension drills increases contraction through a neurological process known as *irradiation.*

Muscles trained: *Biceps, triceps*

ABDOMINAL ISOTENSION

Extend your arms in front of you, with the hands clasped or balled into fists. Brace yourself. Once you are set, exhale fully and curl your trunk forward, contracting the abdominals as hard as possible. Hold for 6-8 seconds. After the first full exhalation, breathe naturally throughout the exercise.

For this movement the antagonists (the spinal erectors) do not need to fire heavily, due to the limited range-of-motion of the trunk.

Muscles trained: *Abdominals*

SPINAL ISOTENSION

Lie prone on the floor, with your hands behind your head and your legs stretched out. Brace yourself. Once you are set, raise your chest and legs off the ground, contracting the spinal muscles as hard as possible. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

For this movement the antagonists (the abdominals) do not need to fire heavily, due to the limited range-of-motion of the trunk.

Muscles trained: *Spinal erectors*

QUADRICEPS ISOTENSION

Hold on to something to keep you steady if you need to, and extend one leg out in front of you. Keeping the leg locked (or slightly kinked), brace yourself. Once you are set, contract the quadriceps as hard as possible, stabilizing the movement with the hamstrings. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can be performed bilaterally, or seated.

Muscles trained: *Quadriceps, hamstrings*

HAMSTRING ISOTENSION

Raise one leg off the ground behind you, holding on to something to keep you steady if necessary. Keeping the leg bent around 90 degrees, brace yourself. Once you are set, contract the hamstring as hard as possible, stabilizing the movement with the quadriceps. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can be performed prone.

Muscles trained: *Hamstrings, quadriceps*

CALF ISOTENSION

Raise your heels several inches from the ground and brace yourself. (It might prove helpful to hold onto something.) Once you are set, contract the calves as hard as possible, stabilizing the movement with the tibialis (shin muscles). Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise can be performed unilaterally, or seated.

Muscles trained: *Calves, tibialis*

FOREARM ISOTENSION

Extend your arms out from your torso, with the hands balled into fists. Brace yourself. Once you are set, squeeze your grip as hard as possible. Hold for 6-8 seconds. Breathe naturally throughout the exercise.

This exercise is worthwhile because a strong grip irradiates to the arm and torso muscles during other isotensions.

Over multiple sets, this exercise can be performed with the arms held out in different directions; up, down, out.

Muscles trained: *Forearms*

ILIT: Impromptu Loadless Isometric Training

Athletes typically think of training in terms of a discrete, time-tabled period; however, because loadless training can be performed anywhere—even in public or at work—the athlete can apply it *multiple times per day,* whenever they have a few spare seconds (waiting in a queue, between commercials, etc). Try these seven drills, in sequence:

1. LOWER LEG ISOTENSION

Tense the calves and lower legs hard. (It can be tough to get the knack of this, at first; lifting the heels half an inch off the ground will help.)

- 1 set of 1-2 seconds

2. THIGH ISOTENSION

While standing upright, tense the quadriceps and hamstrings hard. The legs can be either locked, or bent. (You can even perform this seated.)

- 1 set of 1-2 seconds

3. GLUTEAL ISOTENSION

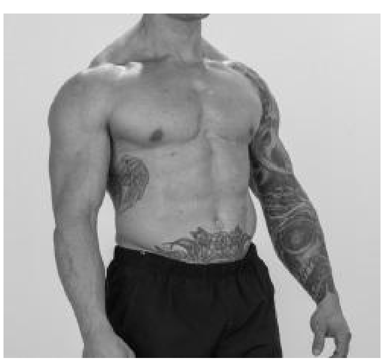
After the thigh tension, tense and squeeze the gluteal muscles together as hard as possible, without moving the hips or thighs.

- 1 set of 1-2 seconds

4. STOMACH ISOTENSION

Smoothly exhale; once the air has left your lungs and the stomach is drawn in, then tense the abdominals hard. There is no need to bend forward.

- 1 set of 1-2 seconds



5. LATERAL TORSO ISOTENSION

Pull the shoulders down in their sockets and tense the lats (under the armpits) hard. You do not need to spread your shoulders out for this drill.

- 1 set of 1-2 seconds

6. PEC ISOTENSION

Pull the shoulders forward in their sockets and tense and squeeze the chest muscles hard. (You don't need to move your arms much.)

- 1 set of 1-2 seconds

7. ARM ISOTENSION

Holding the arms slightly bent or straight, tense the biceps and triceps hard. You also have the option of making a fist, and tensing your grip.

- 1 set of 1-2 seconds

BENEFITS OF ILIT

Impromptu Loadless Isometric Training (ILIT) is not going to turn anyone into a strongman or a bodybuilder, because the loading reflex is too low (see page 81-83); however, it does boast multiple benefits. It tones the muscles; it improves the mind-muscle connection; it refreshes the soft tissues and reduces stiffness caused by inactivity. Squeezing the muscles also helps keep the body warm—we subconsciously do this during cold weather. The practice doesn't need to be recorded, and the athlete can forget to use the method for months, guilt-free. Finally, because ILIT is brief, easy (even pleasant) to perform, and does not affect recovery ability, it can be practiced several times per day. Even small increases in strength will add up over hundreds of sessions per year to significant gains.

The overarching goal of a cool-down is to reduce heart and breathing rates, gradually cool body temperature, return muscles to their optimal length-tension relationships, prevent venous pooling of blood in the lower extremities, which may cause dizziness or possible fainting, and restore physiologic systems close to baseline.

-*NASM Essentials of Personal Fitness Training*[1]

14. Cooling Down
The Binary Method

Many sports scientists and coaches recommend a cool-down period following an intense period of isometric training, and with good reason. Due to the operation of Hill's law (see chapter 2), isometric strength work generates greater tension within the muscular system than any other training method. This fact is what makes isometric training so very effective; however, this tension can remain in the soft tissues or trigger points following a workout. Excess tension can not only cause irritation and create unhealthy movement patterns, it can also slow recovery; athletes who can relax quicker after a training session can recuperate faster. For these reasons, a good cool-down period focusing on relaxing the muscles and removing excess tension, while by no means *essential*, is particularly advisable following an isometric session.

Binary cool-downs

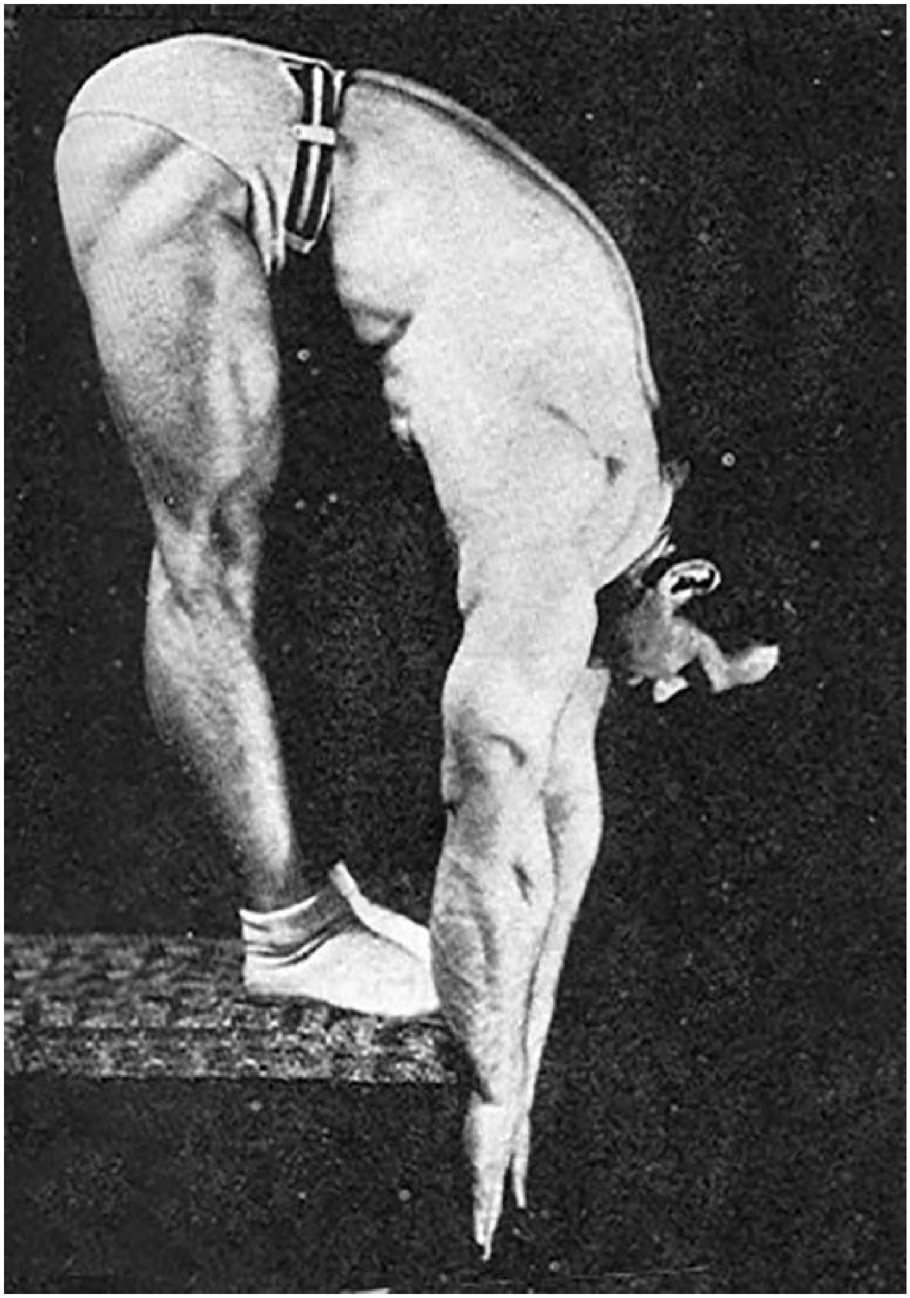
"Cool-down" as an idiom is actually a misnomer; the goal of the post-workout mini-sessions is not to become *cooler,* but to free the muscles from any lingering tightness or tension cause by extreme isometric contractions. There are two basic ways to do this; by *flexibility drills,* which stretch the muscles—the opposite of contraction—and by *relaxation techniques.* The approach to cool-downs presented in this chapter mirrors the binary

structure of the warm-up described in chapter 11; however instead of alternating upper and lower-body drills, we alternate flexibility drills and relaxation techniques. The flexibility techniques demonstrated here are holds or poses, in the vein of some schools of yoga; the relaxation techniques are generally soft, slow-moving drills. To utilize this method, the athlete simply picks five relaxation techniques and five flexibility holds, and alternates them one after the other for 30 seconds each. After all ten drills have been completed (five minutes, total) any lingering tension in the body's tissues will have been worked out, and the athlete can close the training session feeling refreshed and comfortable.

BINARY COOL-DOWN PROTOCOL

- Pick 5 flexibility poses (page 254 to 255)
- Pick 5 relaxation techniques (page 256 to 257)
- Alternate the flexibility and relaxation work
- Perform all 10 back-to-back, without a rest
- Perform each technique for 30 seconds

TOTAL TIME: ***5 minutes***



Muscular strength and size is no barrier to flexibility—as long as you train for it. Mr America, the legendary John Grimek, stretches.

Anyone versed in yoga or the martial arts will realize that there are hundreds of flexibility exercises. You can apply the binary method to any of them. In this chapter, we give *ten* different flexibility exercises to choose from; two stretch the posterior chain (the back of the body), two stretch the anterior chain (the front of the body), two

stretch the knees and quadriceps, two target straight arms (biceps stretch) and two target bent arms (triceps/elbows stretch). A good rule of thumb when stretching is to cultivate a *symmetrical practice*; if you bend backwards, bend forward also; if you twist one way, twist the opposite way afterwards; if you stretch the shoulders up, try to stretch them downwards, etc.

Of the relaxation techniques, two are breathing exercises, two are oscillatory exercises (i.e., shaking the body loose), two are limb-swinging exercises, two are joint-rolling drills, and two are forms of self-massage. There are a huge number of relaxation methods to explore, ranging from ancient Eastern systems (tai chi, qigong, vipassana body-scanning, etc.) to more modern, scientific approaches (autosuggestion, self-hypnosis, biofeedback, and so on). Key skills to work on improving are *somatic tension awareness*—being able to instinctively know which areas are still holding tension after training—and *breath relaxation*—the capacity to progressively relax a target area in tune with the breath.

Tai chi is an excellent system for promoting muscular relaxation.

Flexibility

Posterior Chain	• *Child pose* • *Hang pose*
Anterior Chain	• *Sphinx pose* • *Cobra pose*
Knees/Quadriceps	• *Kneeling pose* • *Deep squat pose*
Straight-Arm	• *Arms back* • *Wall dog*
Bent-Arm	• *Elbows high* • *Bat-wing pose*

Relaxation

Breathing techniques	• *Deep breathing* • *Breathing press*
Oscillatory exercises	• *Arm shaking* • *Leg shaking*
Limb Swinging	• *Tai chi twists* • *Pendulum swings*
Joint Rolling	• *Hip rolling* • *Shoulder rolling*
Self-Massage	• *Back massage* • *Palm massage*

For a binary cool-down, pick five holds from the flexibility column, and five techniques from the relaxation column; then alternate them, performing all ten one after the other for 30 seconds each.

All the above techniques are illustrated over the next four pages. A sample cool-down is detailed on page 258 to 259.

CHILD POSE

PERFORMANCE: Kneel down and relax the torso forward, allowing the trunk to rest on the thighs and the head to touch the floor (if you are able).

AREA STRETCHED: Lower back and spine.

SPHINX POSE

PERFORMANCE: Lying on your stomach, prop your forearms in front of you and rest your weight on them, allowing the torso to gently curve upwards. Look forwards.

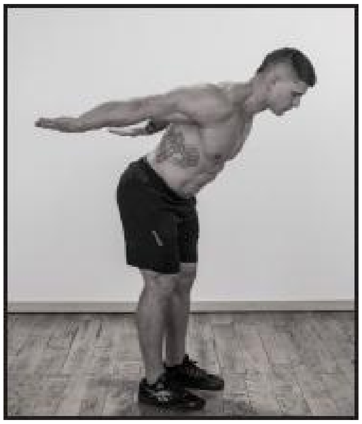
AREA STRETCHED: Abdomen and frontal hips.

KNEELING POSE

PERFORMANCE: Kneel symmetrically on the shins/insteps, keeping the spine straight and upright. More flexible athletes can place the palms behind themselves and lean back.

AREA STRETCHED: Knees and quadriceps.

ARMS BACK



PERFORMANCE: Smoothly bring the arms back behind the body as far as possible, and hold. Keep the arms straight. More flexible athletes can grasp the hands together behind the back.

AREA STRETCHED: Chest, front deltoids and biceps.

ELBOWS HIGH POSE

PERFORMANCE: Place your hands behind your head and draw your elbows upwards until the upper-arms are as close to vertical as possible, and the elbows fully bent. Relax and hold.

AREA STRETCHED: Triceps, elbows, shoulders.

HANG POSE

PERFORMANCE: Bend over at the waist and allow the trunk to relax downwards. Maintain a bend in the knee. More flexible athletes can place their fingers or palms on the ground.

AREA STRETCHED: Spine, glutes, hamstrings.

COBRA POSE

PERFORMANCE: Lying on your stomach, prop your hands in front of you and draw your torso up. Keep the movement smooth and don't force anything. Look forwards.

AREA STRETCHED: Abdomen and frontal hips.

DEEP SQUAT POSE

PERFORMANCE: Relax down into a full squat until your hamstrings are resting on your calves. Keep the feet flat and allow everything to relax deeply under gravity.

AREA STRETCHED: Knees and quadriceps.

WALL DOG

PERFORMANCE: Place your palms flat on a wall above your head, with your arms straight. Keeping your palms in place, gently bow down until you feel a stretch in your ribcage.

AREA STRETCHED: Chest, intercostals, serratus, lats and biceps.

BAT-WING POSE

PERFORMANCE: With your hands on your hips (fingers pointing behind you) gently draw the elbows forward as far as possible, and hold for time.

AREA STRETCHED: Triceps, elbows, shoulders, forearms.

RELAXATION

DEEP BREATHING

PERFORMANCE: Smoothly inhale deeply, expanding your ribcage, before exhaling fully, using the abdomen to assist. Let the arms to follow the movement. Take mini-breaths if needed.

FUNCTION: Relaxes trunk and torso.

ARM SHAKING

PERFORMANCE: Relax the elbows and wrists fully and shake them out, allowing the vibration to further soften your muscles and help release any points of tension.

FUNCTION: Relaxes the upper-limbs and shoulder girdle.

TAI CHI TWISTS

PERFORMANCE: With the entire upper-body relaxed, turn smoothly from side-to-side, allowing your arms to be carried along by the motion.

FUNCTION: Relaxes the arms, shoulders and waist.

HIP ROLLING

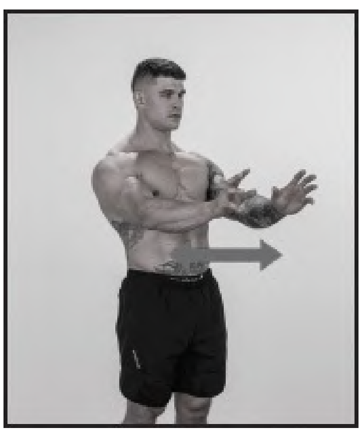
PERFORMANCE: With your hands on your hips, roll your hips clockwise then counter-clockwise in a comfortable, fluid motion. Keep all your joints loose and "soft".

FUNCTION: Relaxes and frees the hips and lower back.

SELF-MASSAGE: BACK

PERFORMANCE: With your hands balled into loose fists, reach to your lower back and massage the muscles with gentle, circular motions.

FUNCTION: Relieves tension in the lower back.



BREATHING PRESS

PERFORMANCE: Smoothly inhale deeply, as you expand your chest and draw your arms back, then exhale fully, pushing your arms out. Repeat. Stay loose, and take mini-breaths if needed.

FUNCTION: Relaxes trunk and torso.

LEG SHAKING

PERFORMANCE: Relax the leg muscles fully and shake them out, allowing the vibration to further soften your muscles and help any points of tension to be released. Alternate legs.

FUNCTION: Relaxes the lower-limbs and hip girdle.

PENDULUMS

PERFORMANCE: Bend at the waist and swing the arms from side-to-side, relaxing them fully and allowing all tension to flow from the upper body.

FUNCTION: Relaxes the arms, shoulders and spine.

SHOULDER ROLLING

PERFORMANCE: With your hands by your sides, roll your shoulders backwards then forwards in a comfortable, fluid motion. Keep all your joints loose and "soft".

FUNCTION: Relaxes and frees the shoulders and neck muscles.

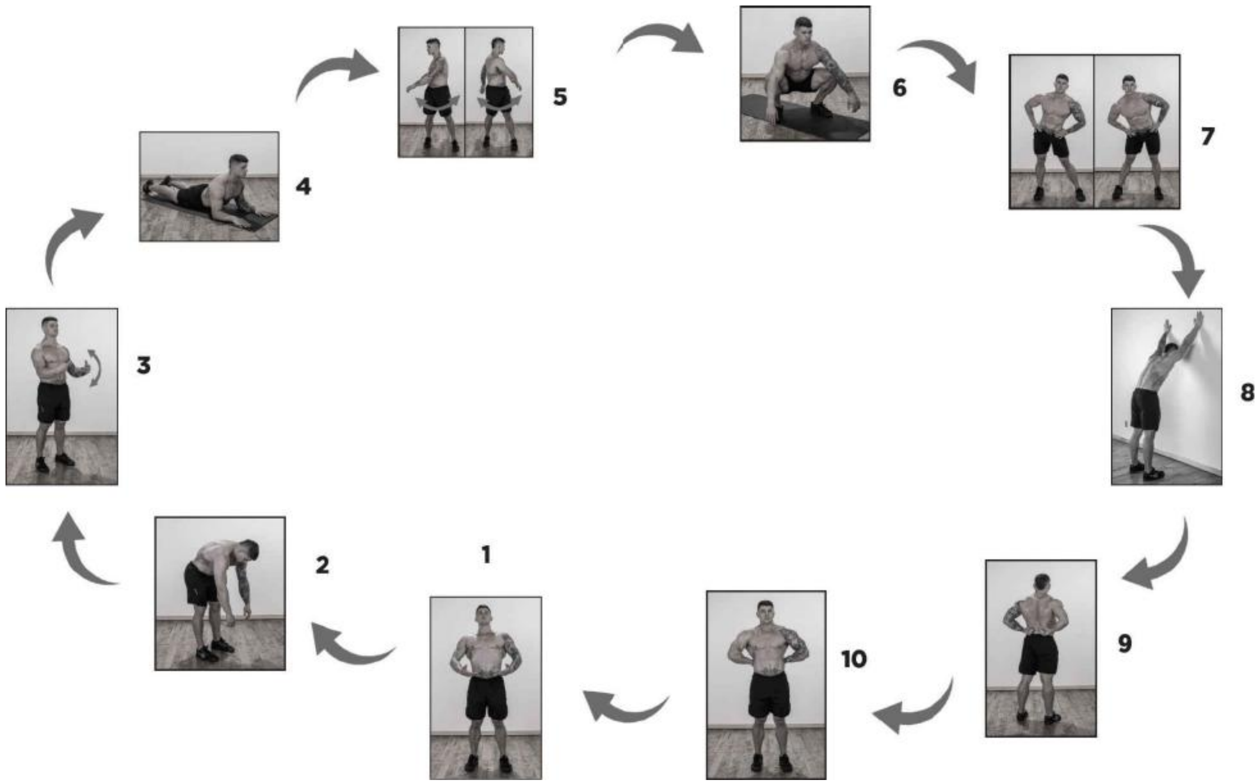
SELF-MASSAGE: PALMS

PERFORMANCE: Place your thumb into your opposite palm and massage the muscles with gentle, circular motions. Try to fully relax the fingers of the hand being massaged.

FUNCTION: Relieves tension in the hands and forearms.

SAMPLE COOL-DOWN

1. Deep breathing	30 seconds
2. Hang pose	30 seconds
3. Arm shaking	30 seconds
4. Sphinx pose	30 seconds
5. Tai chi twists	30 seconds
6. Deep squat pose	30 seconds
7. Hip rolling	30 seconds
8. Wall dog	30 seconds
9. Self-massage: back	30 seconds
10. Bat-wing pose	30 seconds
TOTAL TIME:	***5 minutes***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COOL-DOWNS: TACTICS AND HACKS

- Some tension-release is better than none. If you are pressed for time following an isometric workout, just take a minute to regulate your breathing and shake your limbs loose.

- Flexibility can be useful in some sports, but the point of these poses is simply to release any excess tightness. Don't push too hard, view it as a contest, or try to beat what you did last time: that can actually *cause* tension. Treat every single drill during the cool-down as a mnemonic—a trick to help your entire body remember to relax. That's our mission, here.

- If any of the techniques shown cause discomfort, either avoid them, alter them, or find substitutes. Discomfort *increases* tension, rather than *decreases* it.

- The mind plays a huge role in neutralizing tension. Breathe deeply and smoothly, and try to visualize (or feel) the tension leaving your muscles with each exhalation. (This works for all techniques, not just breathing exercises.)

- Over time you will come to recognize specific "hot spots" in your own body where tension tends to linger. You can give these areas special focus. Some of them are: the lower back, the shoulders and neck, the palms, the hip flexors, etc.

- As already mentioned, there are hundreds of potential stretches to include in your cool-down when you wish to change things up. Yoga is a good option, but avoid poses which are too hard or require muscular tension to hold them. *Yin yoga* is an excellent discipline for relaxation.

- We only give two types of self-massage, but you can massage any muscle of area that feels tight or sore. Qigong is an excellent

resource for soft self-massage techniques.

- Feel free to explore *tools*. This chapter has been kept equipment light, but if you choose you can use tools like foam rollers, massage balls, thermal pouches, etc.

- Your cool down drills don't have to be highly generalized, or selected at random; if you are working specific body-parts in your workout, you can tailor specific flexibility or relaxation techniques to those areas.

- Just as with warm-ups, you can mix and match these techniques to suit yourself. Change your cool-downs frequently to avoid becoming bored. A cool-down should be enjoyable and refreshing—if this isn't the case, you need to change things up.

PART IV

ISOMETRICS: THE PROGRAMS

I have most of my clients perform fully contracted static holds to failure, followed immediately by a negative on those exercises that permit it—and the results are stunning, to say the least.

-Mike Mentzer[1]

15. Isometric Programming

The Ultimate FAQ

Even superior training equipment will yield minimal benefits if an athlete does not utilize it in an optimal manner. We need to understand the basics of programming: fundamental questions like: *How often should I train?* (Frequency); *How much should I do?* (Volume); *How hard should I push?* (Intensity), etc. Any successful isometric training theory should answer ten basic questions asked by athletes:

1. *Do I need to warm up or cool down when using isometrics?*
2. *How fast should I tense my muscles?*
3. *How hard should I push each rep?*
4. *How long should I hold each rep?*
5. *How many sets and reps should I perform for each drill?*
6. *How long should I rest between reps?*
7. *How many angles should I work each drill with?*
8. *How long should isometric training sessions last?*
9. *How often should I work out?*
10. *How do I stop my gains from slowing down?*

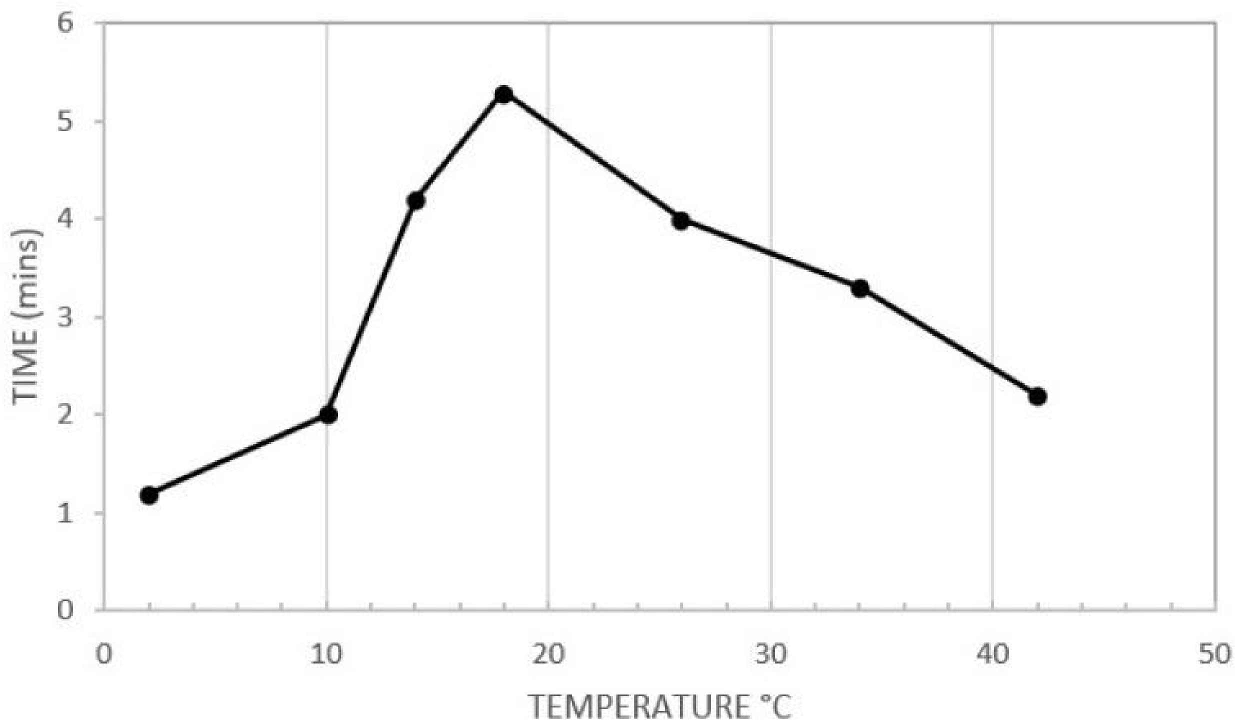
Fortunately, extensive scientific studies conducted in the field of isometrics have supplied us with a large amount of data from which we can draw to answer these questions.

In this chapter, we will be answering these questions, and consequently outlining a fundamental training method for building maximum isometric strength and muscle as rapidly and efficiently as possible. In the subsequent two chapters we will translate these answers into specific training templates. It's *always* of value to understand the science behind a training methodology; however, those athletes who are eager to get to the "hands on" training programs can skip to the summary on page 285, bookmark this chapter for later, and move straight to chapter 16.

1. Do I need to warm up or cool down when using isometrics?

Athletes should be warmed up prior to isometric exercise; not only to reduce the risk of injury[2], but also for performance reasons. The human body carefully regulates its core temperature close to 37 degrees C. "Shell" tissues however—including the muscular system—are more subject to temperature changes based on activity levels and environmental temperature. The shell tissues can vary in temperature from 15 to 40 C. If muscle temperature drops below 27-28 degrees C, isometric strength drops rapidly.[3] (See graph on page 111.) This drop in strength is due to the decrease in metabolism caused by the cooler temperatures; the neuromuscular junction functioning required for peak strength is less efficient at lower metabolic rates.[4]

You don't need to measure muscle temperature or be overheated before training, however for an optimal workout session you should approach your drills already warm. A warmer environment is also ideal, particularly if you plan on performing longer isometric holds: lower environmental temperatures have been proven to decrease isometric endurance:

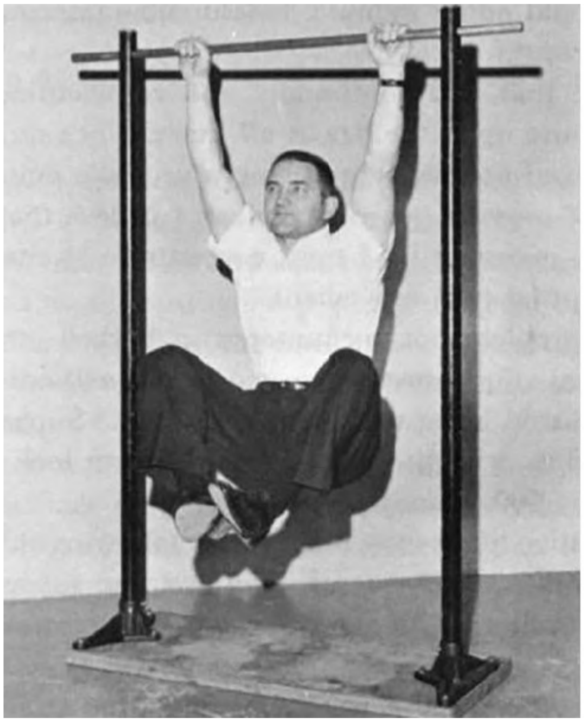
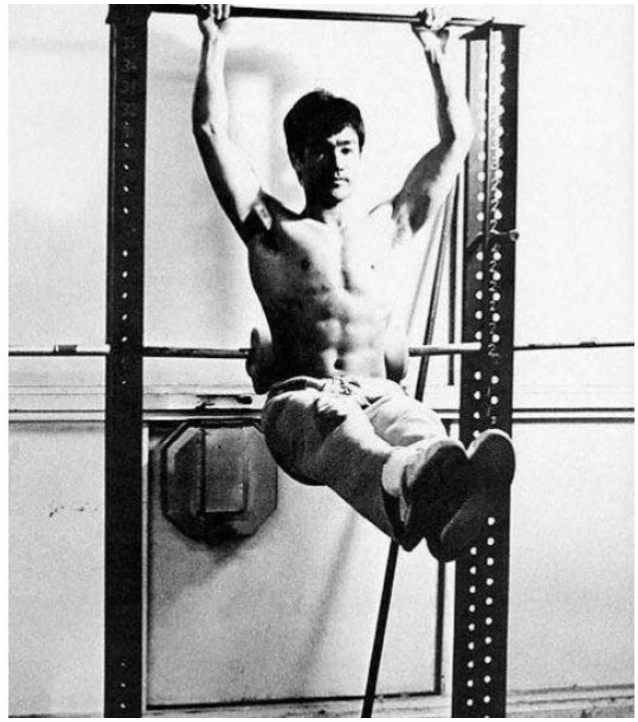


The effect of environmental temperature on isometric endurance[5]

In cooler temperatures wear adequate clothing, and perform a freehand total-body warm-up just to ensure your muscles aren't going in cold. (A suggested system is included in chapter 11.)

A cool-down after training is also an excellent idea. Because isometrics involve such large amounts of muscular tension, Verkhoshansky recommends finishing a session with some relaxation exercises (or possibly some passive flexibility drills).[6] Hoffman felt that it was a good idea to "de-load" the spine with hanging exercises.[7] Abdominal and anterior chain exercises can also serve this purpose. (A complete cool-down system is included in chapter 14.)

ANSWER: Yes, to both. Employ a general warm-up before your session, and perform some light relaxation/de-loading drills afterwards.

Like Hoffman, Bruce Lee believed in hanging to decompress his spine following hard isometric work. While it is true that performing isometrics with bone-crushing weights in a power rack—with the bar resting on top of the spine—may significantly compress the vertebrae, this is not true for Isochain training. Because the handle is held in the hands, the arms and shoulder girdle effectively cushion and absorb any excess load before it reaches the spine.

2. How fast should I tense my muscles?

Although isometrics can be performed explosively to develop muscular *speed,* the best method for increasing *strength* is to slowly and smoothly increase the tension in your muscles until your desired level of contraction is achieved.[8]

Physiologists studying isometrics have learned that larger muscles (and probably all compound exercises) require approximately four seconds (called "rise time" or "attack time") to generate maximum force.[9] For this reason, athletes should avoid mindlessly launching at an exercise or yanking the handle. There is no need to obsessively count to four—although some trainees count *one-one thousand, two-one thousand,* etc., while "winding up"—but all athletes should begin their repetitions with a smooth increase in tension, giving their bodies and minds a few seconds to reach maximum

power output. This is the safest and most productive way to approach isometrics.[10, 11]

ANSWER: Go relatively slow. Smoothly increase tension until your desired force level is achieved.

In contrast, the nervous system can go from very high to very low levels of contraction at high speed.[12] There is no benefit to gradually easing out of a repetition. Once your rep is done, simply relax. You will notice that elite powerlifters do this after a successful deadlift, and Olympic weightlifters similarly just "drop" the weight after their lifts. If you are using an Isochain, there is no need to drop the handle; just relax back into a normal posture at the termination of your hold.

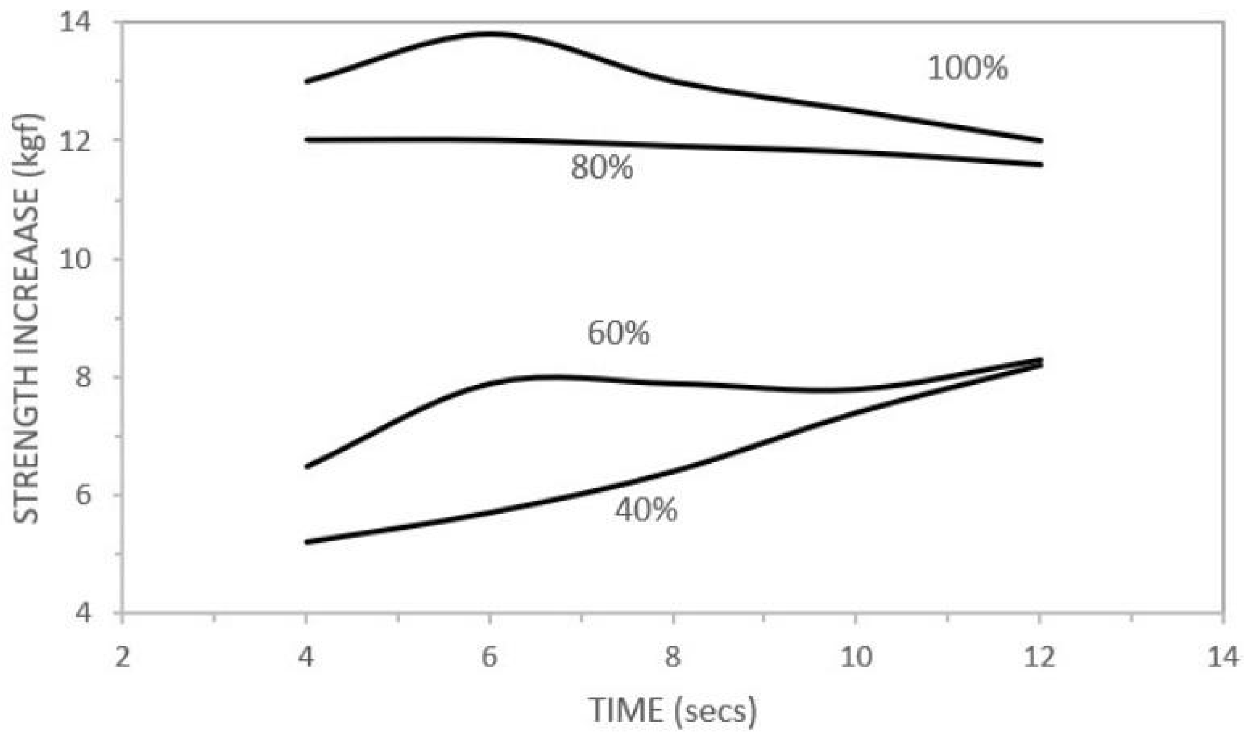
3. How hard should I push each rep?

In isometric training, how hard you train—*intensity*—can be measured in two ways. It can either be subjectively measured as *effort,* or objectively measured as a *percentage of the maximum force you can exert*. In studies, this latter is known by the abbreviation MVC: *Maximum Voluntary Contraction*.[*]

Even early studies of isometrics demonstrated that you do not need to use maximum force during isometric holds to gain good results in strength. For example, Hettinger noted excellent strength gains beyond the threshold of 40-50% of maximum; although he did suggest that it was more practical for athletes to just aim for maximum contractions.[13]

With that said, further research demonstrates that there is still a clear relationship between intensity of tension—how hard you pull or push the handle—and strength development: simply put, the harder you try during your training, the better your results.[14] Most athletes intuitively understand this principle.

Verkhoshanksy summarized the data on this (via Ivanov) in the following graph:



Ivanov isometric intensity graph[15]

The different curved lines on the graph represent different intensities of tension: 40% tension, 60% tension, 80% tension, and maximal, 100% tension. Strength increase as a result of those efforts is represented by the vertical axis of the graph. As you can see; strength increases occur even at 40% tension, however the higher the degree of tension, the better the strength gain. Maximum tension—pushing or pulling against the handle as hard as possible—gives the best results in strength.

...findings suggest that the optimal intensity for isometric strength training is maximal or near maximal.

-Khouw & Herbert, *Optimisation of Isometric Strength Training Intensity*[16]

ANSWER: For the best strength gains, push each rep as hard as possible.

Naturally, how much tension you generate on each repetition is relative to how long you hold that rep; even if you are using maximum *effort*, your tension after fifteen seconds will be significantly lower than your tension after three seconds. That leads us to the next question:

4. How long should I hold each rep?

The above graph also displays the time of the holds used in training, along the horizontal axis. A quick glance shows that, according to the data, maximum strength gains are made with holds lasting approximately six seconds. There is a wide scientific consensus on this (see, for example, Muller's review[17]). This is the reason why the default Time Target of the Isochain is set to six seconds.

ANSWER A: For optimal strength, hold your reps for 6 seconds.

Although the 6-second hold remains the "Gold Standard" of isometrics, shorter repetitions also have value—however you need to perform *more* of them if their effectiveness is going to approach sustained holds.[18] Researchers studying sustained isometric contractions vs brief, rhythmic ones discovered that the brief contractions actually developed strength at an extremely high rate; although many more brief holds had to be performed (so that the tension/force curve added up to equal one sustained hold).[19] Researchers also noted that shorter, rhythmic contractions were psychologically easier to perform than sustained holds.[20]

PRO TIP: ISOMETRIC BODYBUILDING

The programming theory in this chapter has been geared towards general strength-building. It is widely understood that there is a relationship between strength gain and muscle gain—getting stronger will typically net an athlete *some* muscle gain, also[21]. But what about athletes who are uninterested in strength increases, and are only

training for *hypertrophy*—muscle gain? How should they approach isometrics programming?

The best way to program for hypertrophy has been the subject of hot debate for decades. Several factors play a role—including glycogen depletion, and waste product buildup—but science generally agrees that *stress* to the muscles is the major factor in causing hypertrophy.[22] The muscles come under fire, and respond by increasing chemical resources—becoming bigger—to better deal with the stressor if it returns. We know that metabolic stress—depletion of the ATP-PC energy system in muscles—is another strong trigger for muscle growth.[23] ATP typically lasts 10-15 seconds,[24] however it may last *up to* three times that long during isometric contractions, due to the *Fenn effect*,[25] so ~20-45 seconds is a fair approximate target for a growth rep.

It has long been assumed that heavier loads are a key factor for building muscle, although there is actually very little data to support this. In a recent study, a group of researchers from The Exercise Metabolism Research Group of McMaster University set out to test the idea. Using sophisticated histological testing and magnetic resonance imaging, they discovered that test subjects gain just as much muscle whether they trained 90% of their maximum loads, or just 30%—provided they trained to the point of muscular failure.[26] The team concluded that muscular fatigue/failure is the key factor in triggering maximum hypertrophy: not load, or volume. The researchers also studied the effects of different numbers of sets, and concluded that three sets resulted *in a greater and more prolonged myofibrillar protein synthetic rate* –i.e., more growth—than a single set.[27]

The take-home principles of this research:

- If you want to gain muscle, the training load is not as important as going to failure;
- After warming up, train each muscle with three sets (to failure);

- Aim for a rep length of around 20-45 seconds.

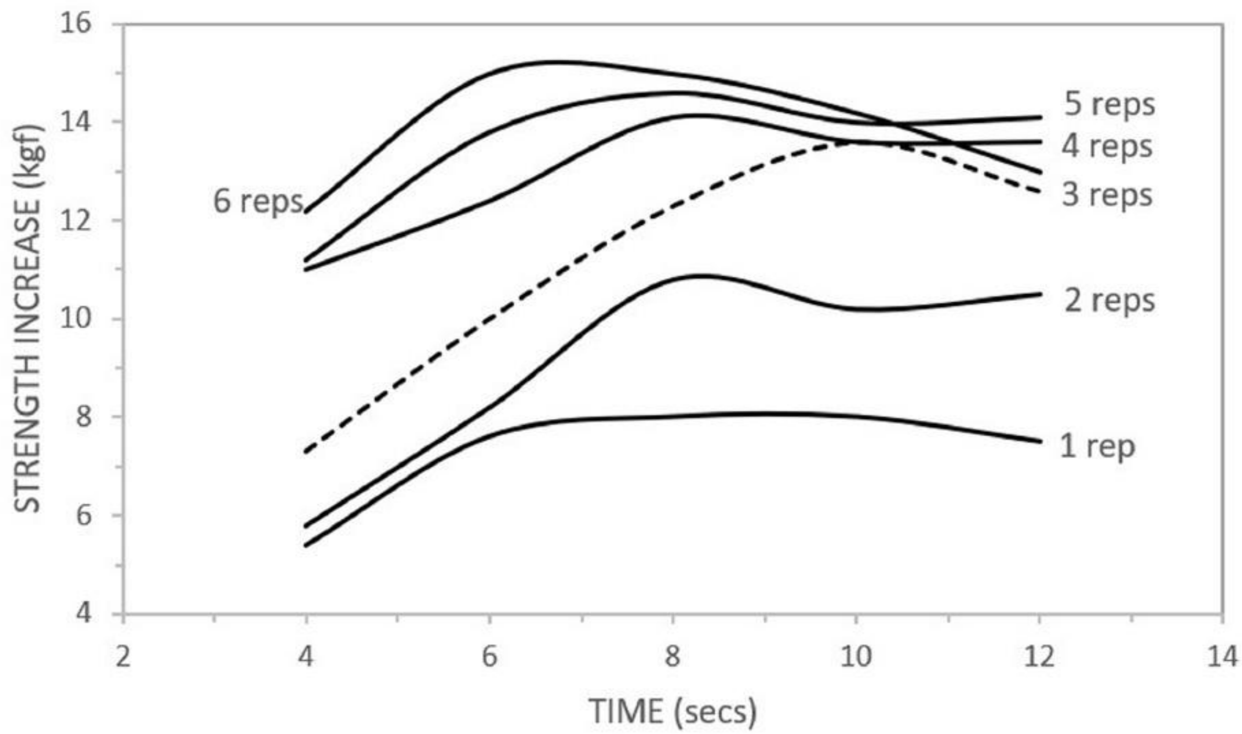
An isometric bodybuilding training program template based on these principles is included in chapter 16 on page 302-303.

As for how long brief, rhythmic holds should be? As a general guideline, brevity is important for motivation and to allow athletes to establish a good pace;[28] however Hettinger[29] determined that very brief contractions—below a second—did not produce worthwhile gains in strength. Anything over a second produces strength gains—although if an athlete is performing sustained holds anyway, they might as well just stick to the superior 6-second rule given above. For these reasons, a period of around one second is a good compromise when performing brief repetitions.

ANSWER B: When performing multiple short reps, stick to a full contraction of ~1 second.

5. How many sets and reps should I perform for each drill?

Verkhoshansky also summarized Ivanov's data with regard to the *number* of holds (i.e., repetitions). The following graph displays which repetition range (the curved lines) gives the best strength results (the vertical axis) in the trials.



Ivanov isometric frequency graph[30]

As you can see, although one repetition does yield strength results, more repetitions accrue even better results. This holds true until we reach about 3 repetitions, when the *diminishing returns* effect sets in, and the lines begin to get closer together. Peak strength development begins to level off after the sixth repetition.

ANSWER A: When performing sustained holds, perform 6 repetitions.

This doesn't mean that everyone should jump into a strength routine requiring six repetitions. Beginners or those new to isometrics should start Timed Mode with just one repetition; after a week of training, reps can be increased by one every other session until 5 are reached. Once an athlete feels comfortable with the routine, they can move to 6 repetitions if desired.

NOVICE	INTERMEDIATE	ADVANCED

1 *Repetition*	2-5 *Repetitions*	6 *Repetitions*
Deconditioned or new to isometrics	*Reps added every alternate session*	*Added when the athlete has adapted to training*

Timed Mode: repetition progression table

Verkhoshansky's chart encourages 6 repetitions of 6 seconds. But what if the athlete has elected to perform briefer repetitions of approximately 1 second (in Load Mode)? In a meta-analysis of isometric studies, McDonagh and Davies[31] discovered that the product of the repetition duration multiplied by the number of reps in isometric drills is a key factor in strength progress. In other words: if your iso-holds are brief, you need to perform more reps to compensate.

Since Verkhoshansky determined an optimal hold duration of 36 seconds for isometric drills (6 repetitions x 6 seconds), repetitions of one-second length should be performed *at least* 36 times to attempt to match this. If your reps are 1-second long, 40 reps is probably a good standard to aim at, although it's not set in stone.

ANSWER B: When performing multiple short reps, perform 36-40 repetitions.

Since we are only aiming at a product of duration x reps, there is no need to perform these all in one go. We can use the sets-and-reps system—taking breaks between group of repetitions performed sequentially (a set). Viable options are:

3 sets of 12	2 sets of 19	4 sets of 10
TOTAL: 36 repetitions	TOTAL: 38 repetitions	TOTAL: 40 repetitions

Load Mode: set and rep schemes

Be aware that the less reps you perform in a set, the higher your workload will be on a rep-per-rep basis, because you will be able to exert more force per set; however, your training session will take longer to complete. As with Timed Mode, you should break in to training gradually. You can begin by using perhaps 30% of your best for three sets of 10, and build up 10% per session until the workout becomes challenging.

ALTERNATE HOLD RANGES

This chapter has been largely built around the classical methodology of 6-second sustained holds. It might be *assumed* that shorter holds—e.g., 1-3 seconds—would produce *more* strength than holds of twice the length, because you can use even heavier loads: however, research seems to indicate that holds of around six seconds are actually superior for strength gain.[32] This may be the result of hypertrophy. Longer contractions cause the blood vessels within the muscle to become constricted; this occlusion in turn causes hypoxia (lack of oxygen) in the muscles, which has been strongly linked to muscle growth.[33] (This is the basis for BFR, *blood flow restriction* training.[34]) Holds of around six seconds may produce the perfect marriage of neurological recruitment (due to the load) and hypertrophy (due to the hypoxia).

This is not to say that alternative hold times are lacking value—varying hold times produce different adaptations which may suit different training goals: in addition, since isometric accommodation occurs at the 6-8 week interval, it is useful from a self-coaching perspective to be able to program differing hold times.

6-second holds and hypertrophy holds have already been discussed in this chapter. If you are exploring 1-3 second holds for pure strength, 8-10 sets (with plenty of rest between sets) is a good approach based on traditional set-systems. Anything beyond 60 seconds is geared to endurance, and can be programmed based on your goals.

TRAINING EFFECT	% MVC	HOLD TIME	TOTAL HOLD TIME
Max Strength	~100%	1-3 seconds	8-10 sets (8 – 30 seconds)
Strength/ Hypertrophy	80-90%	6 seconds	6 sets (36 seconds)
Hypertrophy	60%-80%	20-45 seconds	3 sets (60 – 135 seconds)
Endurance	20%-40%	60+ seconds	4 sets (240+ seconds)

MVC = Maximum Voluntary Contraction

NB: The times on this chart are exclusive of rise time (see page 269)

6. How long should I rest between reps and sets?

If you are performing sustained holds (for example, in Timed Mode) there is no distinction between sets and reps, because you rest after each repetition.

As with all forms of recovery, rest periods can be flexible and based on the individual's ability and goals. You can make excellent isometric strength gains with very little rest between repetitions—Verkhoshansky recommends just 10 seconds[35]—however longer rest periods can also be beneficial, and deliberately rushing through your workout is actually of no benefit to overall strength gain: even if it *feels* more exhausting. Salter compared subjects who performed either fifteen isometric holds per minute, or two per minute. Over a four-week period, she found that although the fifteen-per-minute routine made subjects *feel* more tired, the two-per-minute routine actually produced better results in strength gain.[36]

Although by no means written in stone, Salter's two-reps-per-minute protocol is an excellent guideline when using Timed Mode. For an athlete

employing an "attack time" of approximately four seconds, and a contraction time of six seconds, that would equal a 20 second rest period:

Two reps per-minute protocol:

	4 second rise
	6 second hold
	20 second rest
	4 second rise
	6 second hold
	20 second rest
TOTAL:	60 SECONDS

ANSWER A: When performing sustained holds, 20 seconds rest between reps is a good guideline.

Although 20 seconds rest might not sound very long—particularly to athletes accustomed to regular lifting—research also shows that muscles recover significantly faster between sets after isometrics as opposed to regular weight-training.[37]

When lifting multiple reps per set (in Load Mode), you do not rest substantially between reps, so the concept of *sets* becomes meaningful again. For mathematical reasons, workload during this kind of training is typically higher than for sustained holds (Timed Mode). As a result, longer rest periods between sets are necessary. Breaks of 30s – 60 second between sets are recommended.[38]

ANSWER B: When performing multiple short reps, rest 30s-60s between sets.

Naturally, even longer rest periods can result in more recovery; however, this must be balanced with the fact that they will extend the workout and will also reduce its efficiency. Funderburk (et al.) established that recovery after isometric fatigue begins to radically level off after three minutes, therefore the most efficient rest period should not exceed that time.[39]

7. How many angles should I work each drill with?

Several studies indicate that there is either little or no meaningful angular-specificity when it comes to isometric strength gains.[40,41,42] Although angular-specificity is definitely an occurring phenomenon in the studies, in all likelihood this is due to neurological "learning",[43] or for psychological reasons—the subject becomes used to a specific training angle over time, and is (possibly subconsciously) comfortable pushing harder. If this is the case, training the muscles from just one angle will strengthen those muscles along their entire range-of-motion. Those researchers who disagree, and argue that isometric training has angle-specific effects, still overwhelmingly concur that training at just one angle will have some level of carry-over to other angles.

Training an isometric drill hard at just one angle results in less spread of attention, encourages better focus, and leads to greater training efforts. It also requires less recovery ability, and of course less time commitment. None of this suggests that training muscles at multiple angles is to be avoided, or has no benefits—but it does imply that if an athlete wishes to train in the most efficient manner possible, training at one angle is recommended.

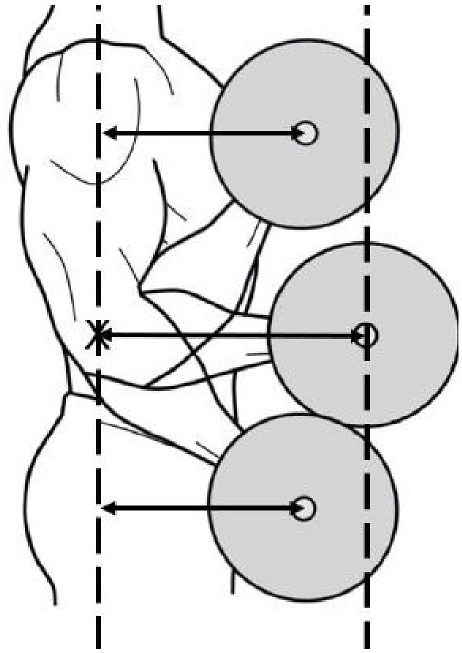
ANSWER: Training just one angle of any drill is the most efficient approach.

PRO TIP: CHOOSING AN ISOMETRIC ANGLE

If an athlete is training only one angle in a drill, the related question then arises: *which angle to choose?* The answer is that there is no one angle which should be used exclusively; training angles should be regularly rotated to avoid accommodation and avoid training plateaus (see page 282-284).

With that said, the best choice of training angle for the *bulk* of the athlete's training time should be close to the mid-point of an exercise. There are two reasons for this. Firstly, the mid-point of most exercises require the major muscle groups involved to be at right-angles to the bones they are moving. This is their strongest, position, anatomically, and allows them to express more force. This makes for greater neural recruitment and superior strength and soft tissue development according to Davis's law.

Secondly, the mid-point of an exercise is usually (but not always) the "sticking point" of an analogous lift. The "sticking point" is training terminology for the point of greatest mechanical disadvantage in any simple movement pattern. The mid-point is typically the sticking point because even though muscles are *anatomically* at their strongest when at right-angles to the bone/s they move, this advantage is outweighed by increased *leverage*; during the mid-point of a movement, the length of the moment arm is furthest from the plane of its fulcrum:[44]



The fulcrum (the elbow joint) remains in the same position, and the lever (the forearm) remains the same length. What changes during this curl is the length of the moment arm (represented by the horizontal arrows). The longer the moment arm, the harder the leverage will be. For a curl, it is exactly at the mid-point of the movement.

Remember, any chain is only as strong as its weakest link; the same principle holds true for movements. A strength athlete can only move as much weight on an exercise as his sticking point limits him (or her) to move; so, by significantly increasing strength in the sticking point angle (via isometrics), athletes will automatically be able to amplify their strength in conventional, dynamic lifts. This is why weightlifters who perform isometrics inevitably emphasize the sticking point angle of their lifts.[45] This effect is not just theory, but has been proven experimentally.[46]

8. How long should isometric training sessions last?

The length of an isometric training session is a difficult one to definitively answer because more highly conditioned athletes are able to

recover from longer training sessions. Despite this, most sports scientists tend to err on the side of caution when it comes to isometric training—even where advanced athletes are concerned. This is because *although* isometric exercise leaves you feeling less sore and beaten up following training (due to the absence of intra-muscular movement, and the resulting waste products: see chapter 5) isometric training allows athletes to recruit more motor units than other methods.[47] As a result, it may be more fatiguing to the Central Nervous System; like muscle pain, CNS fatigue can be cumulative, however unlike muscle pain, its symptoms are easily hidden.[48]

For this reason, Verkhoshansky recommended athletes limit hard isometrics sessions to ten minutes.[49] Ackland suggested a volume limit of 30 max-effort reps.[50] If we apply this to our previous recommendation (page 277) of two reps per minute, that gives a slightly higher guideline of 15 minutes per session.

ANSWER: Limit the majority of your hard training sessions to 10-15 minutes.

As with all variables which include individual recovery as a factor, some flexibility must be allowed for. If there are periods where an athlete is energized and motivated to perform longer sessions, these can be permitted; however, they should be followed by periods of lower frequency/lower volume training. Long, drawn-out sessions may be popular in bodybuilding and various other forms of conventional weight-training, but remember that isometrics is a more efficient form of training.[51] A little goes a long way.

9. How often should I work out?

Hettinger[52] and Atha[53] both determined in their research that daily isometric training produced maximum strength development. Their studies also showed that, while perhaps not as effective as daily training, less frequent routines still produced excellent strength gains. Hettinger's results showed that alternate-day training was 80% as effective as daily training,

and once per week was 40% as effective. (Interestingly his experiments also showed that although isometric training once every two weeks did not build strength, it did effectively maintain any strength previously developed). Hettinger also noted that multiple daily isometric sessions produced no more strength gain than a single daily session.[54]

Later studies have emphasized that it's impossible to outline a one-size-fits all program when it comes to an optimal number of training sessions, because different individuals possess differing recovery abilities: age, gender and previous training experience are also factors. Some athletes might require less frequency than others.[55] For this reason, three training sessions per week remains an excellent rule of thumb.[56] Three training sessions per week using either maximal or submaximal intensity has been shown to result in a significant increase in absolute strength; up to 79% in as little as sixteen weeks.[57]

ANSWER: Three isometric training sessions per week is a great guideline.

The three-day rule is a guideline, not a minimum. Obviously if you are performing other sports activities or strength training alongside isometrics, you may have to reduce this number. If you feel over-tired, burnt out or sore, insert extra rest days into your training.

Two or three training sessions per week will bring about significant increases in maximal strength. Three sessions per week is the routine usually used in studies.

-Fleck & Kraemer[58]

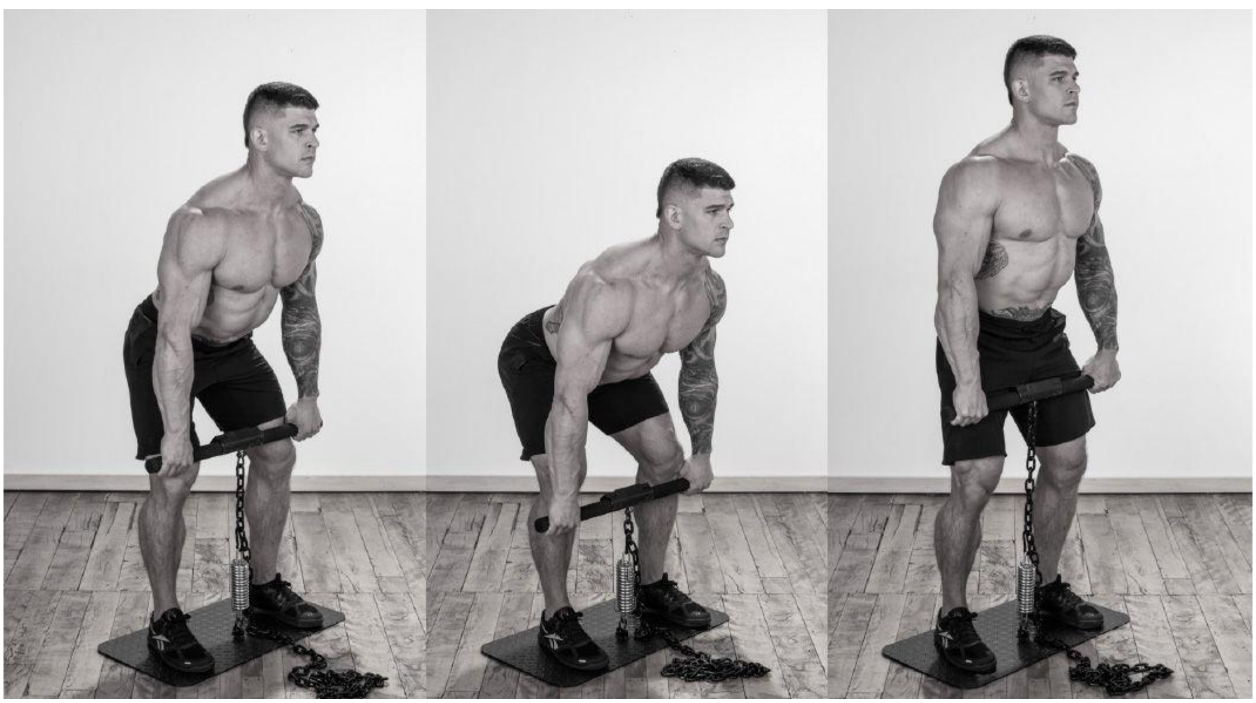
10. How do I stop my gains from slowing down?

Most types of strength or size training are effective to some degree in the short term. However, it is generally accepted that if an athlete spends too long following any given training program, *accommodation* sets in; the body

begins to stop responding to that program and gains in strength and size start to diminish. This is true for all forms of resistance training, and isometrics is no different. Medvedev determined that isometric accommodation occurs in approximately 6-8 weeks.[59]

The best way to avoid the accommodation effect is to change the nature of the stimulus. There are a number of valid means of doing this; altering training intensity, volume, frequency, rest periods, etc. The most common way to do this in conventional dynamic training is to simply change the *exercises* you are using. One analogous isometric training tactic would be to change your *training angle* on your exercises.

For example, if you have been performing Isochain deadlifts at the mid-point for 6-8 weeks, drop the load you are using by 20-30% and begin performing low-point deadlifts. Increase the load again gradually over another 6-8 weeks, until you establish a new personal best, or progress levels off. At this stage, return to mid-point deadlifts or explore top-level deadlifts:



PIC: 6-8 weeks of mid-point isometric deadlifts, your progress may begin to slow down; just drop the load slightly and build up again at another angle. 6-8 weeks later, repeat the process.

It doesn’t matter whether you choose an angle higher or lower than your previous position, however bear in mind that those studies which *do* suggest that isometric training is angle-specific generally indicate that the angle-specific training effect is most significant over approximately +/- 20 degrees.[60] Therefore if you are changing your training angle on an exercise to prevent accommodation, ensure that you choose an angle at least 20 degrees divergent from your previous position.

ANSWER: Change your training program every 6-8 weeks.

The tactics in this chapter form a corpus of *general principles* which can inform any kind of isometric training. However, if we wish to exploit our knowledge and translate it into super-normal strength and development, then general principles are not enough. Once they are grasped, the next step must be to shape these methods into *specific programs*. In the next chapter, we will be doing just that, presenting eight archetypal (and incredibly effective) Isochain programs which are built on the above principles.

SUMMARY OF ISOMETRIC TRAINING PRINCIPLES

1. Do I need to warm up or cool down when using isometrics?

ANSWER: Yes, to both. Employ a general warm-up before your session, and perform some light relaxation/de-loading drills afterwards.

2. How fast should I tense my muscles?

ANSWER: Go relatively slow. Smoothly increase tension until your desired force level is required. -Four seconds is a good approximate "attack time"; you can relax immediately after each rep.

3. How hard should I push each rep?

ANSWER: For the best strength gains, push each rep as hard as possible.

4. How long should I hold each rep?

ANSWER A: For optimal strength, hold your reps for 6 seconds.

ANSWER B: When performing multiple short reps, stick to a full contraction of ~1 second.

5. How many sets and reps should I perform for each drill?

ANSWER A: When performing sustained holds, perform 6 repetitions.

ANSWER B: When performing multiple short reps, perform 36-40 repetitions.

6. How long should I rest between reps?

ANSWER A: When performing sustained holds, 20s rest between reps is a good guideline.

ANSWER B: When performing multiple short reps, rest 30s-60s between sets.

7. How many angles should I work each drill with?

ANSWER: Training just one angle of any drill is the most efficient approach.

-If you have to choose, pick the "sticking point" of the lift. This is usually the mid-point.

8. How long should isometric training sessions last?

ANSWER: Limit the majority of your hard training sessions to 10-15 minutes.

9. How often should I work out?

ANSWER: Three isometric training sessions per week is a great guideline.

10. How do I stop my gains from slowing down?

ANSWER: Change your training program every 6-8 weeks.

-An excellent approach is to change the training angle of your exercises by >20 degrees.

*To learn how to discover a percentage of your MVC, see page 306 to 307.

When properly performed, isometrics are capable of producing a deep level of muscular inroad using less of one's recovery energy and resources. This is due to the effects of intramuscular friction.

-Andrew Baye[1]

16. Programming using the Modes

The Isochain has been designed to be highly versatile and adaptive. Each of the Isochain's four major training modes can be applied to multiple training methods. In this chapter, we'll look at the major methods applicable to each mode. Each training mode is associated with *two* distinct training methods:

I. TIMED MODE: Timed mode allows you to use the default Time Target (of 6 seconds) or customize your own. There are two fundamental ways to use this mode:

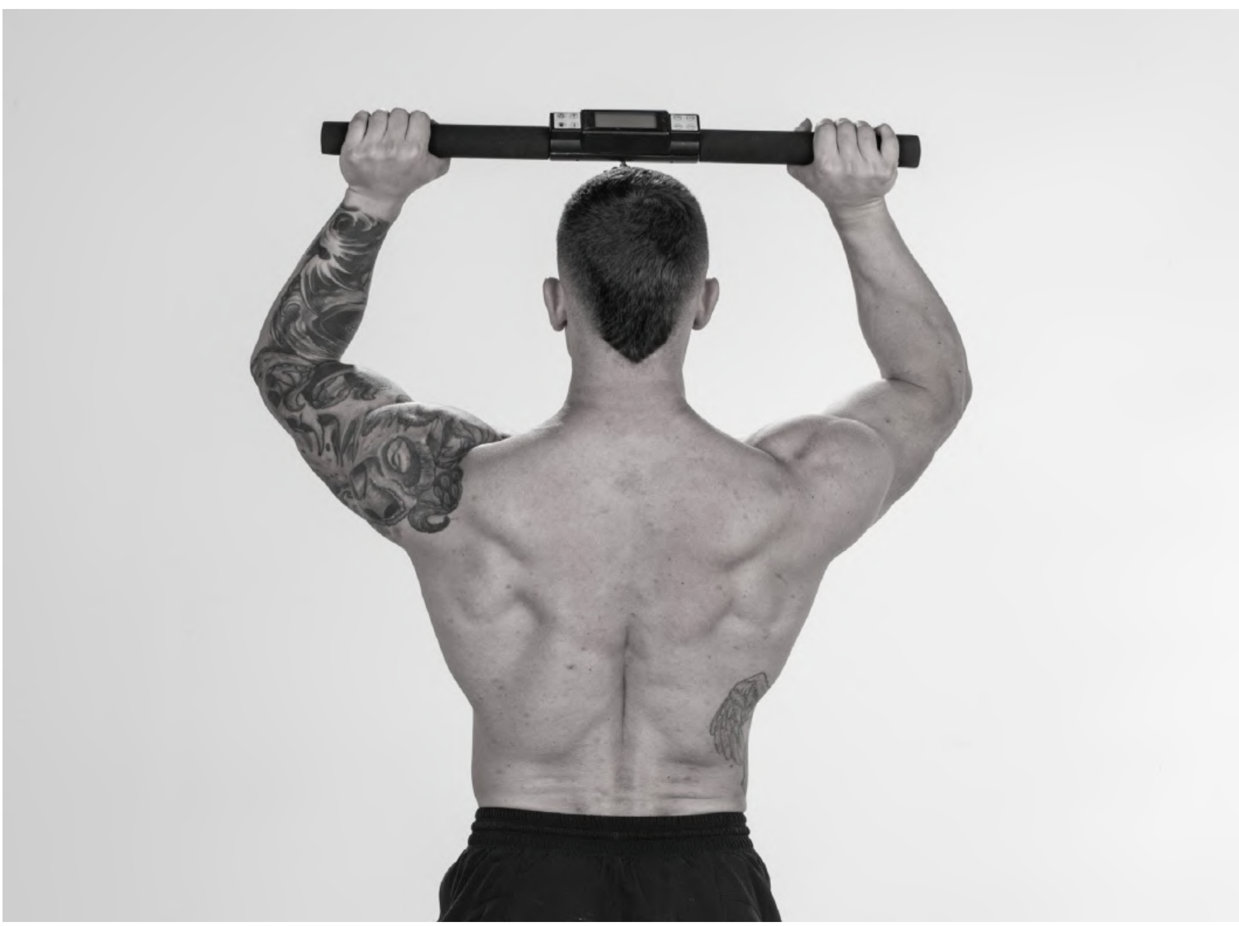
Double progression: You can aim for a certain number of reps (for example, 6) with a Target Load/Target Time, then increase the Target Load every time you achieve that number. This is called *double* progression, because you are increasing the total number of the holds first, then the load second.

Single progression: Pick a lower Target Load you know you can achieve for a certain number of reps—perhaps 50% your one-rep max for 6 reps (each lasting 6 seconds)—and use that, gradually increasing the weight over time as your strength increases. This is called *single* progression; the reps don't increase, only the load.

II. LOAD MODE: This mode doesn't time you, but it does tell you when you reach a pre-selected Target Load during a contraction. There are two ways to use this mode:

Time targeting: This method involves longer holds. Using this mode you can hold a selected Target Load and make progress by gradually adding seconds to your holds; perhaps you could begin with a load you can only hold for five seconds, and build up to 15 seconds—when you reach 15 seconds on all your reps, increase the Target Load next time.

Sets and reps: Selecting a fixed Target Load on the Isochain is a lot like adding fixed weight to a barbell. You can use it in a similar way, also. If you want, you can perform sequential, brief repetitions, contracting until the unit tells you you've reached the required load, then relaxing and immediately contracting again. You can organize these efforts into classic set-and-rep schemes; for example, 4 sets of 10 contractions (reps).



Holding the load: time targeting

III. MAX MODE: This mode tells you the maximum force used during any given repetition. There are two main ways to use this mode:

Strength testing: Warm up over several sets to ensure your neurological recruitment is at its peak. Then perform three maximum efforts in one drill, with long rests in between. Finally, calculate the average of those three numbers. This protocol is not a training method *per se,* just a way to discover your 1-rep max—i.e., your absolute limit strength in any drill. Knowing your 1-rep max can be useful if you need to calculate a percentage of it for various other workout programs.

Singles training: For this method you use brief reps again, just holding the drill long enough to exert maximum force. Unlike the sets and reps method used with Load Mode, you are not tied to any pre-selected Target Force. You can just push as hard as you can every time you approach the drill, and the device will tell you afterwards how well you did. This is a very productive, hardcore method of training. It works well for multiple sets of just one rep, with longer rests between efforts.

Singles training builds limit strength

IV. AVERAGE MODE: This mode is different from the others because it gives you the *average* force per second applied during your last repetition—no matter how long or short that rep was. This can give you an important figure: your isometric *muscle output* (i.e., the average force, multiplied by the length of the rep in seconds). This mode is not time dependent—meaning you can choose how long to hold your rep, or just go as long as your muscles are capable. This mode's two major uses are:

Muscle capacity: This might be the simplest possible way to train. Push a drill with 100% effort, for as long as you can. Time yourself. This is an *autoregulation* method; you don't plan numbers: your body stops when it stops. When you're done, calculate your *muscle output* (your average force x seconds). Next time, try to beat that number. This methodology is analogous

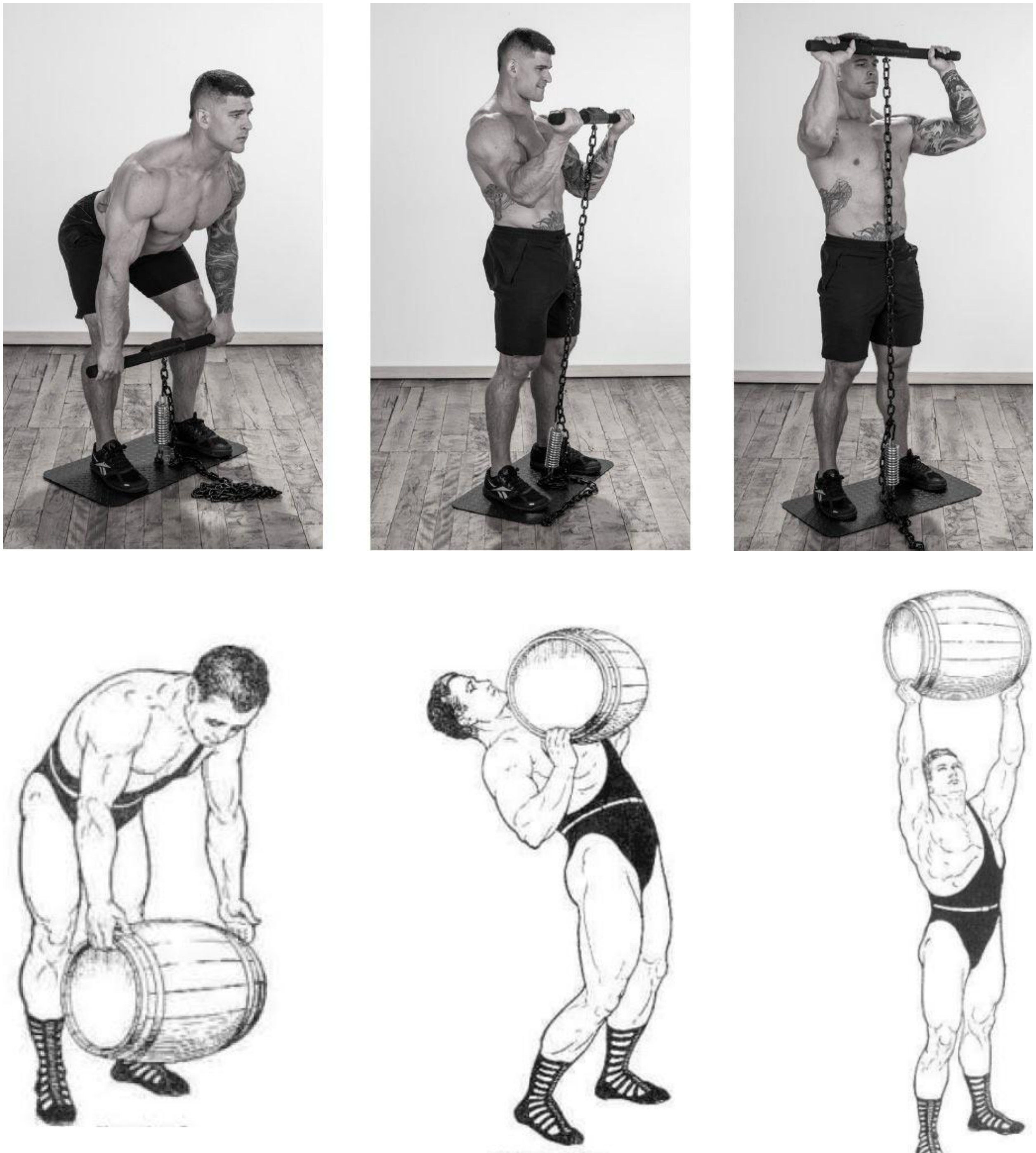
to training to "failure" in bodybuilding—you don't work to a set time (say, 10 seconds), because you don't know when your muscles are going to give out.

Endurance holds: In this approach you pick a time—a longer period, of say, 60-180 seconds—and hold a drill during that time. Unlike work capacity, you are not seeking to push yourself to 100% the entire time—the muscles cannot maintain 100% effort for very long, anyway. You can either freestyle your intensity level, or keep an eye on the display and try to keep around a certain percentage of your max. Calculate your muscle output afterwards (average force x seconds).

MODE	MEASURES	TRAINING METHODS
DEFAULT: FEEDBACK	Fluctuating force levels in real time	Useful for experimenting with new techniques/self-calibration/warm-ups
A. TIMED	Pre-selected minimum force over fixed time	-Double progression -Single progression
B. LOAD	Pre-selected minimum force	-Time targeting -Sets and reps
C. MAX	Maximum force	-Strength testing -Singles training
D. AVERAGE	Average force per second	-Muscle capacity -Endurance holds

Which training method is best?

The method you choose is up to you. We would recommend that beginners and those seeking all-round strength and development should focus on a basic double progression workout (*The Promethean*: given on page 296 to 297). Once progress from this program begins to slow, jump to the *The Promethean: Mark II* (page 298 to 299). Alternatively, athletes accustomed to in-gym training who favor traditional set-and-rep systems can begin with the program *Old School* detailed on page 304 to 305.



The fundamental movements of The Promethean mirror functional strength patterns: the deadlift, the upward pull (or curl), and the press.

As you grow more experienced, it's a good idea to use multiple different training methods—even if you have a favorite program that works really well for you. Because isometric accommodation occurs every 6-8 weeks—i.e.,

your body begins to adapt to the workout, and slows down progress—it's a good idea to change your workouts when this occurs. The easiest way to do this is by changing your training angles for drills, but another great way—particularly when you've got some training time under your belt, and know what you're doing—is to explore the different methods given in this chapter. Are you growing accustomed to double progression? Experiment with singles training. Singles training getting stale? Move to a muscle capacity workout for 6-8 weeks. Constantly adapting your training like this can be a great way to continue making progress and setting personal records, while introducing the kind of variety and freedom into your training which encourages plenty of motivation.

Never forget—the workouts in this chapter are only *examples* of ways you could apply these particular methods—you can easily invent your own workouts using different drills, different times, rest periods, training days, etc. The actual number of workouts you can perform on an Isochain are incredibly vast.

In the remaining pages of this chapter, we will explore these methods, linking each one to a sample program template. By the time you complete this section, a huge toolbox of isometric workout methods will be open to you.

PROTOCOL: Specific drill warm-up

MODE: *Feedback Mode*

One of the main uses of the default mode of the digital console is to assist in a warm-up before a higher intensity "work" drill. Having warm muscles not only helps prevent injuries, it also improves isometric performance (see page 267). As well as employing a general warm-up to heat up the shell tissues (see chapter 11), the athlete is also advised to warm-up before hitting specific drills. The warm-up below can be done by "feel"—no inputting loads into the console—and should last less than a minute per drill. The 4-stage warm-up given below is just a template: better conditioned athletes can skip sets 1 and 4, and older, injured or more deconditioned athletes can perform set 1 twice.

		Reps	Rep Duration	Effort
Warm-up set 1:	Planned drill	1	20 seconds	Easy
Warm-up set 2:	Planned drill	1	10 seconds	Medium
Warm-up set 3:	Planned drill	1	5 seconds	Harder
Warm-up set 4:	Planned drill	1	1 second	70-80%

REPS	2-4 per drill
REP DURATION	20 seconds - 1 second
REST PERIOD	10-15 seconds between reps
INTENSITY	Easy-to medium-hard effort
PROGRESSION	N/A

PROTOCOL

1. Apply a general warm-up to increase body temperature (chapter 11).

2. Turn on the console (Feedback Mode).

3. Perform up to four progressive warm-up sets. These can be performed using a percentage of your 1-rep max*, but for convenience's sake they can also be judged by *feel*:

   -The first set (20 seconds) should be easy; around 20% of your 1-rep max, or just enough to feel a slight tension in the muscles. Now is a good time to pay attention to how your body feels—any injuries? Stiff muscles? If you feel tight, perform this set twice.

   -The second set (10 seconds) should be moderately hard; around 35% of your 1-rep max, generating a burn in the muscles and increasing blood flow.

   -The third set (5 seconds) should be around 50% of your maximum effort. Now is a good time to begin focusing on technical aspects; foot placement, grip, etc.

   -The fourth set (1 second) should be around 75% of max; just enough to give your nervous system and muscles a strong contraction to prepare them.

4. Rest 30 seconds before performing your "work" drills.

*To discover how to establish your 1-rep max for a drill, see page 306-307.

PROGRAM: "The Promethean"

Method: *Double progression*

MODE: *Timed Mode*

If there is such a thing as a *perfect* isometric protocol for strength and development—*The Promethean* would be the one. The combination of repetition duration and the number of holds is scientifically proven, and the athlete is forced to work at a very high level of effort during later repetitions in order to make progress. *The Promethean* focuses on only three drills, but the techniques selected not only work every muscle in the body—they also mimic the three key positions of functional strength: lifting something up (*the deadlift*), holding something (*the curl*), and pushing something (*the press*).

		Reps	Duration
MONDAY:	1. Deadlift	4-6	6 seconds
	2. Curl	4-6	6 seconds
	3. Shoulder press	4-6	6 seconds
TUESDAY:	Off		
WEDNESDAY:	1. Deadlift	4-6	6 seconds
	2. Curl	4-6	6 seconds
	3. Shoulder press	4-6	6 seconds
THURSDAY:	Off		
FRIDAY:	1. Deadlift	4-6	6 seconds
	2. Curl	4-6	6 seconds
	3. Shoulder press	4-6	6 seconds
SATURDAY:	Off		
SUNDAY:	Off		

REPS	4-6 per drill
REP DURATION	6 seconds (default)
REST PERIOD	20 seconds between reps
INTENSITY	Pre-selected Target Load
PROGRESSION	When 6 reps of 6 seconds are achieved, increase load

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11), plus a specific warm-up before each drill (page 294-295).

2. Initiate Timed Mode on the console. Enter your Target Load. (If you are new to this program, your Target Load should be 50% of your 1-rep max.)*

3. Build contraction on each drill until you reach your Target Load and the console bleeps. The console bleeps again once every second, until the six seconds are completed. Try to complete the full 6 seconds.

4. Rest for 20 seconds between repetitions, breathing smoothly and shaking your muscles loose.

5. Try to complete all 6 reps of 6 seconds on each drill.

6. After each drill, record in your training journal or app your Target Load, your reps, and the duration of each rep.

7. If you are able to achieve the full 6 reps of 6 seconds on a drill, increase your Target Load by 5-10lbs for the next session.

8. After the completion of your session, perform a cool-down (chapter 14).

*To discover how to establish your 1-rep max for a drill, see page 306-307.

PROGRAM: “The Promethean” Mark II

Method: *Double progression*

MODE: *Timed Mode*

The *Mark II* is essentially the same methodology as *The Promethean*—same rep durations and progression—but with two different sessions performed back to back. A different lower-body hold, pull, and push are added, and the athlete rests on Day 3. This means more drills and more training in total, however the individual exercises are worked *less* often. As a result, this program would work excellently for advanced athletes who deal with so much load in the basic drills that one day off is not long enough to recover before revisiting them. It would also suit athletes with slightly less recovery ability, generally.

		Reps	Duration
DAY ONE:	1. Deadlift	4-6	6 seconds
	2. Curl	4-6	6 seconds
	3. Shoulder press	4-6	6 seconds
DAY TWO:	1. Front squat	4-6	6 seconds
	2. Bent row	4-6	6 seconds
	3. Chest press	4-6	6 seconds
DAY THREE:	Off		

Repeat

REPS	4-6 per drill
REP DURATION	6 seconds (default)
REST PERIOD	20 seconds between reps
INTENSITY	Pre-selected Target Load
PROGRESSION	When 6 reps of 6 seconds are achieved, increase load

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11), plus a specific warm-up before each drill (page 294-295).

2. Initiate Timed Mode on the console. Enter your Target Load. (If you are new to this program, your Target Load should be 50% of your 1-rep max.)*

3. Build contraction on each drill until you reach your Target Load and the console bleeps. The console bleeps again once every second, until the six seconds are completed. Try to complete the full 6 seconds.

4. Rest for 20 seconds between repetitions, breathing smoothly and shaking your muscles loose.

5. Try to complete all 6 reps of 6 seconds on each drill.

6. After each drill, record in your training journal or app your Target Load, your reps, and the duration of each rep.

7. If you are able to achieve the full 6 reps of 6 seconds on a drill, increase your Target Load by 5-10lbs for the next session.

8. After the completion of your session, perform a cool-down (chapter 14).

*To discover how to establish your 1-rep max for a drill, see page 306-307.

PROGRAM: "6 x 6"

Method: *Double progression*

MODE: *Timed Mode*

6 x 6 is very similar to *The Promethean;* however, it not only includes the ideal rep duration (6 seconds), but also the perfect number of reps (6). The trade-off is that intensity levels are slightly lowered to maintain these numbers. Another excellent workout for overall strength and development at any level.

		Reps	Duration
MONDAY:	1. Front squat	6	6 seconds
	2. Shrug	6	6 seconds
	3. Bent-over row	6	6 seconds
	3. Shoulder press	6	6 seconds
TUESDAY:	Off		
WEDNESDAY:	1. Front squat	6	6 seconds
	2. Shrug	6	6 seconds
	3. Bent-over row	6	6 seconds
	3. Shoulder press	6	6 seconds
THURSDAY:	Off		
FRIDAY:	1. Front squat	6	6 seconds
	2. Shrug	6	6 seconds
	3. Bent-over row	6	6 seconds
	3. Shoulder press	6	6 seconds
SATURDAY:	Off		

REPS	6 per drill
REP DURATION	6 seconds (default)
REST PERIOD	20 seconds between reps
INTENSITY	Pre-selected load
PROGRESSION	When 1-rep max increases by 10%, increase load

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11), plus a specific warm-up before each drill (page 294-295).

2. Initiate Timed Mode on the console. Enter your Target Load. (Your Target Load should be 70% of your 1-rep max.)*

3. Build contraction on each drill until you reach your Target Load and the console bleeps. The console bleeps again once every second, until the six seconds are completed. Try to complete the full 6 seconds.

4. Rest for 20 seconds between repetitions, breathing smoothly and shaking your muscles loose.

5. Try to complete all 6 reps of 6 seconds on each drill.

6. After each drill, record in your training journal or app your Target Load, your reps, and the duration of each rep.

7. If you are unable to achieve the full 6 reps of 6 seconds on a drill, decrease your Target Load by 10% for the next session. Every 2-4 weeks, retest your 1-rep max and adjust your target weight appropriately.*

8. After the completion of your session, perform a cool-down (chapter 14).

*To discover how to establish your 1-rep max for a drill, see page 306-307.

PROGRAM: "The Burn Count"

Method: *Time targeting*

MODE: *Load Mode*

Another fundamental way to make gains in isometric strength is to hold a fixed load for a progressively longer period of time; when you reach your target time, increase the weight and drop the time again. This form of isometrics has been used extensively with barbells and dumbbells, and is tried and tested. It works, but it can be very strenuous—particularly when you are using heavy loads and pushing very hard to extend your previous time. For this reason, the number of repetitions is kept low. Because of the high levels of effort and extended hold periods, this program builds strength, but it would also work well for those looking to build muscle.

		Reps	Duration
DAY ONE:	1. Deadlift	2	20-45 seconds
	2. Biceps curl	2	20-45 seconds
	3. Shoulder press	2	20-45 seconds
DAY TWO:	Off		
DAY THREE:	1. Front squat	2	20-45 seconds
	2. Bent-over row	2	20-45 seconds
	3. Chest press	2	20-45 seconds
DAY FOUR:	Off		

Repeat

REPS	2 per drill
REP DURATION	20-45 seconds
REST PERIOD	1 minute between reps
INTENSITY	Pre-selected load
PROGRESSION	When a 45 second rep is achieved, increase load

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11), plus a specific warm-up before each drill (page 294-295).

2. Initiate Load Mode on the console. Enter your Target Load.

3. Build contraction on each drill until you reach your Target Load and the console bleeps.

4. Counting the bleeps (or keeping an eye on a clock or digital timer) try to keep holding at least that load for 20 seconds.

5. Record in your training journal or app your Target Load and how long you managed to maintain the repetition at that load.

6. Rest for one minute between repetitions, breathing smoothly and shaking your muscles loose.

7. Repeat. If you are able to achieve the full 45 seconds on both repetitions on a drill, increase your Target Load by 5-10lbs for the next session.

8. After the completion of your session, perform a cool-down (chapter 14).

PROGRAM: "Old School"

Method: *Sets and reps*

MODE: *Load Mode*

It's possible to use an isometric program for sets and reps rather than sustained holds. This workout is an example of that approach. It involves 3 drills per session, all performed for four sets of ten repetitions—each contraction (i.e., each rep) is held only for around one second before the athlete relaxes again and immediately repeats. This program would work particularly well for athletes fond of conventional in-gym methods, who find that they psychologically respond well to sets and reps. It also affords a pleasant change of pace for any athletes who have been performing sustained holds for a long period of time.

		Reps	Duration
MONDAY:	1. Deadlift	4 sets of 10	1 second
	2. Curl	4 sets of 10	1 second
	3. Shoulder press	4 sets of 10	1 second
TUESDAY:	Off		
WEDNESDAY:	1. Front squat	4 sets of 10	1 seconds
	2. Bent row	4 sets of 10	1 second
	3. Triceps extension	4 sets of 10	1 second
THURSDAY:	Off		
FRIDAY:	1. Deadlift	4 sets of 10	1 second
	2. Curl	4 sets of 10	1 second
	3. Shoulder press	4 sets of 10	1 second
SATURDAY:	Off		
SUNDAY:	Off		

Continue alternating the two sessions, taking weekends off

REPS	4 sets of 10 per drill
REP DURATION	1 second
REST PERIOD	30 seconds between sets
INTENSITY	Pre-selected load
PROGRESSION	When 4 x 10 feels easier, increase load

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter11), plus a specific warm-up before each drill (pages 294-295).

2. Initiate Load Mode on the console. Enter your Target Load.

3. Build contraction on each drill until you reach your Target Load and the console bleeps. Hold the rep for approximately one second, before relaxing and repeating. Try to reach 10 reps.

4. Rest for 30 seconds between repetitions, breathing smoothly and shaking your muscles loose.

5. Repeat for the required sets and reps on all drills.

6. Record in your training journal or app your Target Load, your sets and reps, and how difficult the workout felt to you.

7. This is the only protocol which allows for progress based on instinct—just like old school workouts. If you can complete 4 x 10 for each drill, increase the weight, only if you feel comfortable and ready to do so. Increments of 2- 10lbs are acceptable.

8. After the completion of your session, perform a cool-down (chapter 14).

PROGRAM: "One-Rep Max"

Method: *Strength testing*

MODE: *Max Mode*

This protocol is not a training method, but a testing and programming tool. There are numerous reasons to test your maximum voluntary contraction (MVC) in any given drill. Some programs (for example, *6 x 6*, page 300-301) require the trainee to work to a percentage of their maximum strength—this protocol will help you establish that figure. It can also be a good idea to periodically and seriously test and record your absolute maximum strength in the fundamental drills, in order to track your progress over time. In addition to this, most athletes are curious about their limits. There's nothing wrong with this. There will probably come a point in your training where you just want to flat-out know how strong you are. This is the best way to reliably discover your best numbers.

		Reps	Duration	Effort
Warm-up set 1:	Any drill	1	20 seconds	Easy
Warm-up set 2:	Any drill	1	10 seconds	Medium
Warm-up set 3:	Any drill	1	5 seconds	Hard
Max set 1:	Any drill	1	Approx 1-2	100%
Max set 2:	Any drill	1	Approx 1-2	100%
Max set 3:	Any drill	1	Approx 1-2	100%

REPS	6 total per drill
REP DURATION	20-5 seconds (warm-ups); approx 1 second (max sets)
REST PERIOD	30 seconds (warm-ups); 1 minute (max sets)
INTENSITY	Various (warm-ups); 100% effort (max sets)
PROGRESSION	N/A

PROTOCOL

1. Apply a general warm-up to increase body temperature (chapter 11).

2. Set the console to Feedback Mode.

3. Perform three progressive warm-up sets. These can be judged by feel. The first set should be easy; just enough to feel a slight tension in the muscles. The second set should be moderately hard, generating a burn in the muscles and increasing blood flow. The third set should feel around 75% as hard as you could do if pushing as hard as possible. Rest 30 seconds between warm-up sets.

4. Perform three maximum effort repetitions, resting one full minute before each maximum attempt.

5. After each rep, press the MAX key and record the maximum load attained.

6. Add the three maximum loads together, and divide by three. This figure is your 1-rep max.

7. After the completion of your session, perform a cool-down (chapter 14).

PROGRAM: “Military Power”

Method: *Singles training*

MODE: *Max Mode*

Military Power is an archetypal pure strength routine. It is abbreviated—focusing only on two drills—but this allows the athlete to pour all their resources into those drills, both in terms of training and adaptation. Maximum force levels also build “strength skill” as well as amplified discipline. Because the total hold duration time is low—only 10 seconds per workout—this method is less effective at generating muscle than the others in this chapter. *Military Power* would work very well for an athlete looking to build superior strength but with an absolute minimum of added muscle mass. Because isometrics is easier to recover from, it would also work well as strength routine performed symbiotically *alongside* traditional bodybuilding programs.

		Reps	Duration
DAY ONE:	1. Deadlift	10 sets of 1	1 second
DAY TWO:	1. Shoulder press	10 sets of 1	1 second
DAY THREE:	1. Deadlift (different level)*	10 sets of 1	1 seconds
DAY FOUR:	1. Shoulder press (different level)*	10 sets of 1	1 seconds
DAY FIVE:	Off		
DAY SIX:	Off		

Continue alternating the two sessions, taking weekends off

*Perform the drill with the handle at a different level than during the previous session.

Ensure you use a joint angle at least 20 degrees divergent from the previous one.

REPS	10 per drill
REP DURATION	1 second
REST PERIOD	60 seconds between reps
INTENSITY	100% effort
PROGRESSION	Autoregulation

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11), plus a specific warm-up before each drill (pages 294-295).
2. Set the console to Feedback Mode.
3. Perform each drill with as much effort as possible. Smoothly generate tension up to your maximum, lifting the handle as much as you possibly can. Hold this effort for around a second, before relaxing.
4. After each rep, push the MAX key to determine your max load.
5. Record in your training journal or app the maximum load you reached, as displayed on the console.
6. Rest for one minute between repetitions, breathing smoothly and shaking your muscles loose.
7. Repeat 3-6 for all repetitions.

8. After the completion of your session, perform a cool-down (chapter 14).

PROGRAM: "3 Days On"

Method: *Muscle capacity*

MODE: *Average Mode*

3 Days On is an isometric variation of the classic bodybuilding "split" workout. There are lots of exercises designed to cover the entire body; with upper-body on Days One and Three, and lower-body on Day Two. The program is also designed to be high intensity, with the athlete pushing to muscle failure over three timed periods of 20-45 seconds (this being the approximate time it takes to deplete the ATP-PC system so crucial for muscle growth: see page 272). Because this workout relies purely on *perceived* max effort, it works best if rotated with methods based on predetermined Target Loads. If this method is too difficult to recover from, either add rest days or perform the three days on Monday, Wednesday and Friday instead.

		Reps	Duration
DAY ONE:	1. Shoulder press	3	20-45 seconds
	2. Front raise	3	20-45 seconds
	3. Biceps curl	3	20-45 seconds
DAY TWO:	1. Front squat	3	20-45 seconds
	2. Calf raise	3	20-45 seconds
	3. Deadlift	3	20-45 seconds
DAY THREE:	1. Bent-over row	3	20-45 seconds
	2. Shrug	3	20-45 seconds
	3. Triceps extension or chest press	3	20-45 seconds
DAY FOUR:	Off		
	Repeat		

REPS	3 per drill
REP DURATION	20-45 seconds
REST PERIOD	20-30 seconds between reps
INTENSITY	100% effort
PROGRESSION	Autoregulation

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11), plus a specific warm-up before each drill (pages 294-295).

2. Set the console to Feedback Mode.

3. Contract hard throughout each drill. Your goal is to completely drain your muscles and hit total muscle failure.

4. If you are pushing hard enough, you should fail at around 20-45 secs.

5. After each rep, push the AVG key to determine your average load.

6. Record in your training journal or app your hold time and average load.

7. Rest for 20-30 seconds between repetitions, breathing smoothly and shaking your muscles loose.

8. Repeat for all reps and drills. You don't have to purposefully increase any variables—load, rep duration, etc.—in this protocol. As you gain in muscle capacity, the average load will automatically increase.

9. After the completion of your session, perform a cool-down (chapter 14).

PROGRAM: IRON MAN

Method: *Endurance holds*

MODE: *Average Mode*

Iron Man is a painful but effective way to increase muscular stamina and work capacity. It is based around two sets of drills; one series being performed for 120 seconds; the second series for half that time. Endurance training can be built well with higher levels of frequency than strength or hypertrophy work; those who can perform this and recover quickly (no exhaustion, zero soreness) can gradually experiment with removing the off days.

		Reps	Duration
DAY ONE:	1. Deadlift	1	120 seconds
	2. Biceps curl	1	120 seconds
	3. Shoulder press	1	120 seconds
DAY TWO:	Off		
DAY THREE:	1. Front squat	1	60 seconds
	2. Calf raise	1	60 seconds
	3. Bent-over row	1	60 seconds
DAY FOUR:	Off		

Repeat

REPS	1 per drill
REP DURATION	60/120 seconds
REST PERIOD	1 minute between reps
INTENSITY	Low-to-high effort
PROGRESSION	Autoregulation

PROTOCOL

1. Warm-up. Use a general warm-up to increase body temperature (chapter 11). A specific warm-up for each drill may not be required.
2. Initiate Feedback Mode on the console.
3. Throughout each rep, aim to contract at around 40-20% of your 1-rep max for 60 or 120 seconds (depending on the drill).
4. Keeping an eye on a clock or digital timer, hold the repetition for 60-120 seconds (depending on the drill).
5. After each rep, push the AVG key to determine your average load.
6. Record in your training journal or app your rep time and average load.
7. Rest for one minute between repetitions, breathing smoothly and shaking your muscles loose.
8. Repeat for all reps and drills. You don't have to purposefully increase any variables—load, rep duration, etc.—in this protocol. As you gain in work capacity, the average load will automatically increase.

9. After the completion of your session, perform a cool-down (chapter 14).

I’ve found that isometrics minimizes wear and tear on the body, while producing as good—or better—strength and hypertrophy results.

-Steve Maxwell[1]

17. Alternative Isometric Programs

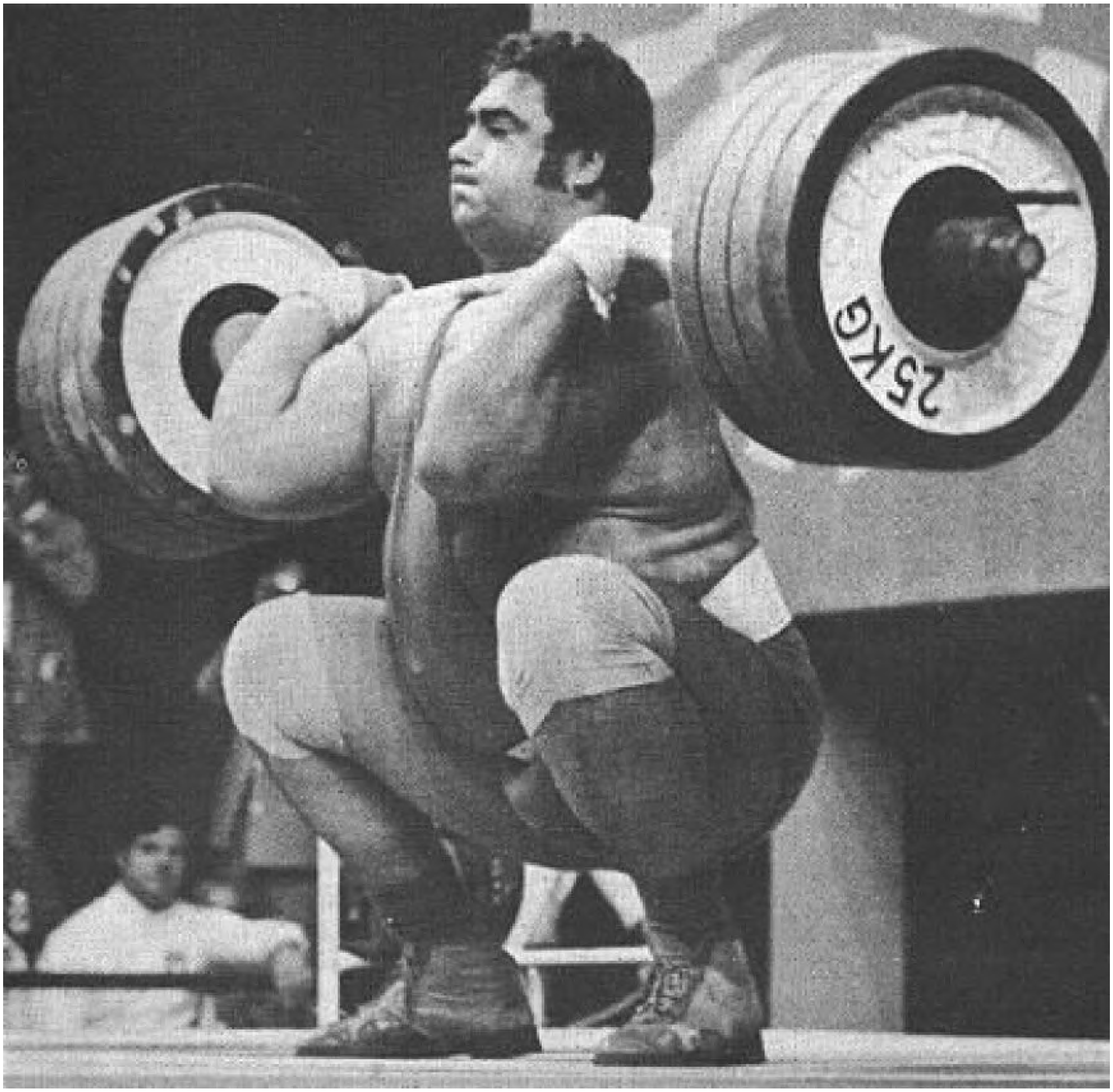
The previous chapter detailed ten Isochain training protocols—a Default Mode warm-up method, three programs for Timed Mode, and two programs each for Load Mode, Max Mode, and Average Mode. These should be considered the standard programs for the modes: they are straightforward, logically designed, and they dovetail with the scientific data, for the best results.

It doesn’t mean that they are the only programs you can use with an Isochain, however—or even that they are the only programs you *should* use. Isometrics is by no means a new method; it has had many adherents and proponents in the world of strength and conditioning: some of them absolutely fanatical. Many coaches and athletes have experimented and sweated over loaded isometrics over the last sixty or seventy years, and come up with their own conclusions on how it should be used.

In this chapter we will be exploring the methods of many of these great trailblazers—in some cases we will be giving exact workouts as used, whereas other examples are inspired by certain approaches. We will be looking at theories from Soviet scientists; weightlifters, powerlifters, martial artists and cutting-edge bodybuilding coaches. As well as these classic routines, we have also added high-efficiency programs like “Vertical Sets”, plus multiple options for calisthenics aficionados.

When the time comes that you want to explore some new ground in your own isometrics training, you'll definitely find something in this box of tricks to inspire you.

SOVIET STRENGTH: Verkhoshansky's Protocol



Vasily Alekseyev

Throughout the 50's and 60's, the Soviets routinely destroyed the competition in Olympic weightlifting and other strength-based events. A major reason for this was the Russians' dedication to sports science. Whereas in the West, weightlifting routines were often sporadic and based on personal experience or anecdote, the Soviets took it to the next level and brought in real

scientists to conduct iron-based experiments and study the data. To this day, the Russians are respected world over for being masters of strength science. Perhaps the best-respected of all was Professor Yuri Verkhoshansky, former head of the Russian Central Institute of Physical Culture and Sport Scientific Research Laboratory. Dr Verkhoshansky was a huge advocate of isometrics for developing strength; and he used isometrics with his world-beating athletes as well as in the lab—he knew what worked and what didn't. In his classic work Supertraining *(with Mel Siff), Verkhoshansky outlined the principles behind the perfect isometric workout. The protocol presented here is based on his work.*

		Reps	Duration
DAY ONE:	1. Low-position deadlifts	6	6 seconds
	2. Low-position presses	6	6 seconds
DAY TWO:	1. Low-position squat	6	6 seconds
	2. Low-position clean pull	6	6 seconds

Repeat, taking days off as necessary

- Gradually increase to maximum tension for each rep
- Hold each rep for 6 seconds
- Rest 5-10 seconds between reps
- Finish each session with relaxation exercises

- *Prof. Verkhoshansky quoted research which indicated that isometrics in the stretch (i.e., bottom) position had more strength transfer to other muscle angles*

- *Verkhoshansky favored 6 second holds performed for 6 reps*

- *Verkhoshansky believed that short rests—5-10 seconds—were best between holds*

- *He believed that isometrics were so fatiguing to the nervous system that sessions should be kept short—with a ten-minute cap*

- *He believed that all sessions should be followed by special relaxation drills to counteract the high levels of tension generated by isometrics*

MARTIAL ARTS: Bruce Lee's Routine

Bruce Lee adjusting his chain-and-bar device. Brandon looks on.

If you're talking about sport that is one thing. But when you are talking about combat—as it is—well then, baby, you'd better train every part of your body.

-Bruce Lee

The legendary Bruce Lee wasn't only the most famous martial artist in the world. He was also an obsessive advocate of strength and fitness methods—believing that somebody out of condition had no chance in a serious fight. As with his fighting style, Jeet Kune Do, Lee explored and experimented with strength training methods and absorbed what he found useful to him, discarding the rest. One approach he valued highly and returned to throughout his career was isometrics. Lee felt that isometrics and martial arts were a perfect fit, for various reasons: performed with low volume, isometrics can build strength and power without adding bulky muscle; isometrics builds mental strength and discipline; and isometric workouts are faster and less exhausting than conventional weight-training. This last reason was crucial for Lee, as he did not want his strength training to interfere with his daily martial arts sessions.

		Reps	Duration
DAY ONE:	1. Press (top position)	1	6-12 seconds
	2. Press (bottom position)	1	6-12 seconds
	3. Calf raise	1	6-12 seconds
	4. High pull	1	6-12 seconds
	5. Front squat (middle position)	1	6-12 seconds
	6. Shrug	1	6-12 seconds
	7. Deadlift (middle position)	1	6-12 seconds
	8. Front squat (top position)	1	6-12 seconds

Repeat up to 7 days per week

- Push each rep as hard as possible—100% effort
- Rest 30-40 seconds between exercises

- Finish each session with a hanging abdominal exercise (knee or leg raises)

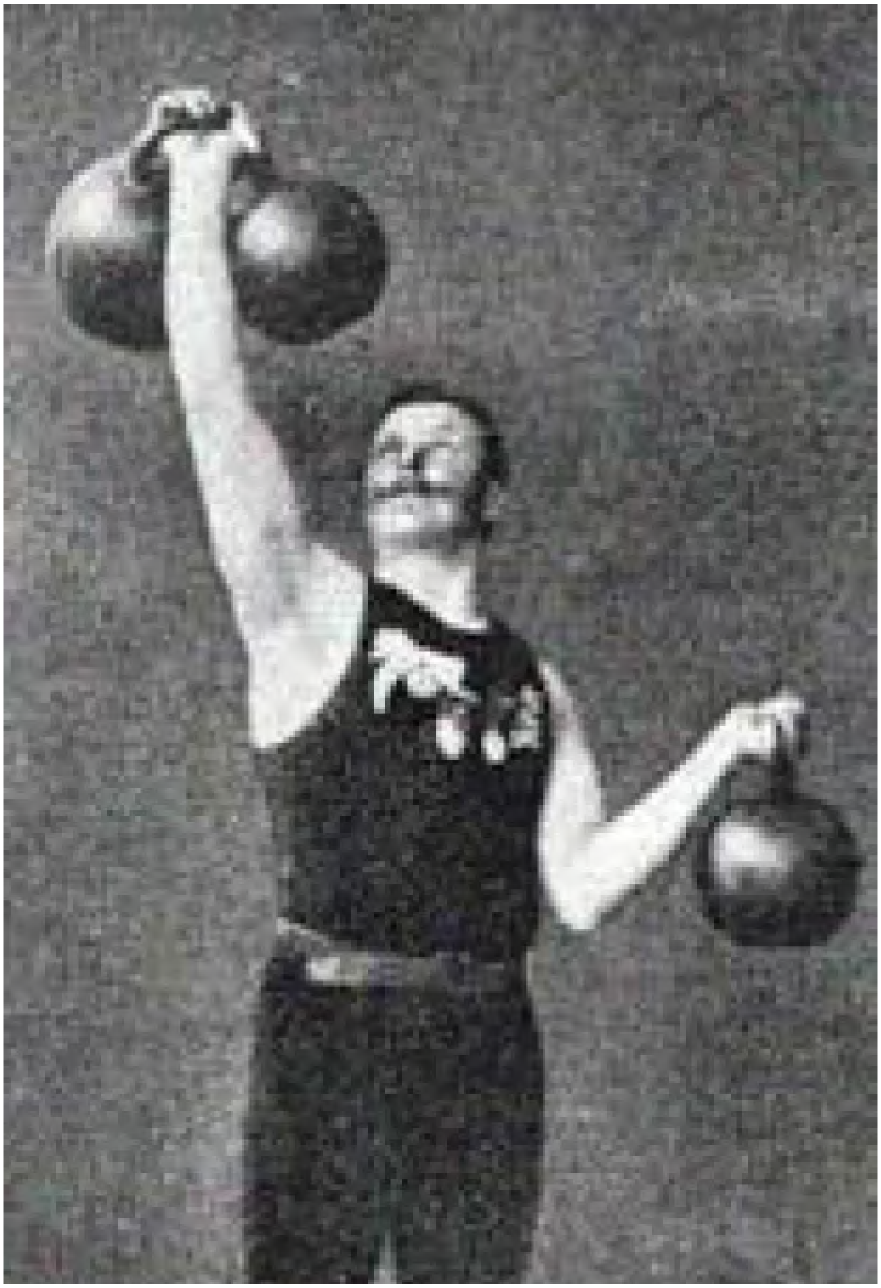
- To make this protocol measurable, you can use Feedback Mode, recording your time and average load after each rep

- *Lee favored very low volume: just one maximum-effort rep on each exercise, to avoid becoming muscle-bound or tight*

- *Keeping isometric strength training to a minimum—no more than 15 minutes per day—allows athletes plenty of time and energy for whatever 'skill' work they require for their discipline; in Lee's case martial arts, however the principle applies to all sports*

- *Lee advised that all martial artists should combine strength training with speed and flexibility work*

KETTLEBELLS PLUS ISOS



Old-school kettlebell athlete

It is time to bring this secret weapon back.

-Pavel Tsatsouline on isometrics

One of the biggest—and most lasting—movements in modern strength and conditioning is the army of the kettlebell: the RKC (Russian Kettlebell Challenge) founded by John Du Cane and Pavel Tsatsouline. For those few who are unaware, kettlebells have been described as "cannonballs with handles". To those who are in the know—coaches, serious trainers and conditioning experts—kettlebells have achieved almost mythical status for their ability to increase raw strength and total-body endurance in double-quick time. It is no coincidence that high-level kettlebell experts are generally isometrics advocates, also: both systems have long histories, both have passed the test of time, and both are backed by extensive scientific studies. Far from being mutually exclusive, both methods can work well together. There are numerous ways to combine these two "big beasts". The protocol presented here is based on one of the tried-and-tested core programs of the RKC.

		Reps	Duration
MONDAY:	Heavy kettlebell presses/swings or snatches		
TUESDAY:	1. Deadlifts	6	6 seconds
	2. Squats	6	6 seconds
	3. Bent-over row	6	6 seconds
WEDNESDAY:	Light kettlebell presses/swings or snatches		
THURSDAY:	Off		
FRIDAY:	Moderate kettlebell presses/swings or snatches		
SATURDAY:	1. Deadlifts	6	6 seconds
	2. Squats	6	6 seconds
	3. Bent-over row	6	6 seconds
SUNDAY:	Off		

- Work the kettlebell presses with ladders; i.e., a set of 1 rep, then 2 reps, and so on. If you can manage a 5-rep set, repeat in reverse.

- Work the snatches/swings with various higher-rep schemes

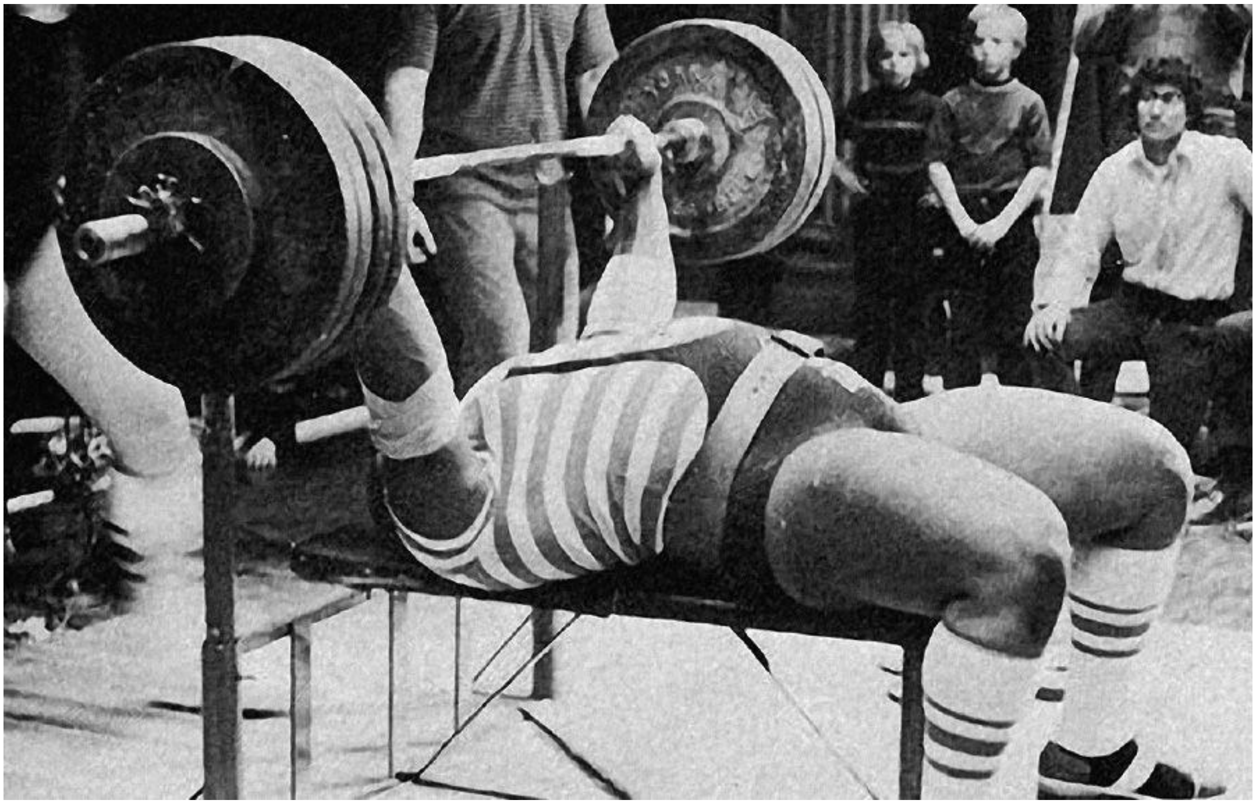
- On isometrics days, warm up with some kettlebell get-ups and leg raises to heat up the waist and shoulder girdle

- Rest 20-30 seconds between isometric reps

- Apply moderate-to-high intensity on the holds, using Timed Mode

> - *Kettlebell athletes typically do a lot of overhead work (presses, jerks) and upright pulling (snatches and swings). To balance this out, the isometric days (Tuesday and Saturday) focus on heavy leg and back drills*
>
> - *Many kettlebell programs include 'variety' days, and isometrics slot well into this*
>
> - *For more details on kettlebell exercises and programming, refer to* Enter the Kettlebell *(Pavel Tsatsouline, Dragon Door Publications)*

POWERLIFTING AND ISOS



There has always been the question, which is more productive, dynamic or isometric exercises? In my opinion, both must be trained.

-Louie Simmons

If the effectiveness of isometrics for building limit strength is only a surprise to the general gym-goer, it's certainly not to elite powerlifters, for whom isometrics has been an open secret for years. Many of the world's top powerlifting coaches have written extensively about the value of isometrics. One if these coaches is the infamous Louie Simmons—founder and mastermind behind the exclusive "invitation only" Westside Barbell Club: the gym with the greatest number of powerlifting world record holders on the planet. One major benefit of isometrics for powerlifters is that it allows athletes to spend more tension at the "sticking point" of a lift; if a certain tiny

range of a barbell technique is what's stopping the lift from going up—why not spend more time just working that exact section? There's evidence that isometrics can "teach" the body to neurologically adapt to particular positions at a super-quick pace. This is exactly what many advanced powerlifters do. The protocol below is one such example. It's designed for the advanced lifter who has reached a plateau in his deadlift due to a sticking point.

		Reps	Duration
DAY ONE:	1. Deadlift (sticking point)	1	3 seconds
		1	3 seconds
		1	3 seconds
		1	3 seconds
		1	3 seconds
		1	3 seconds

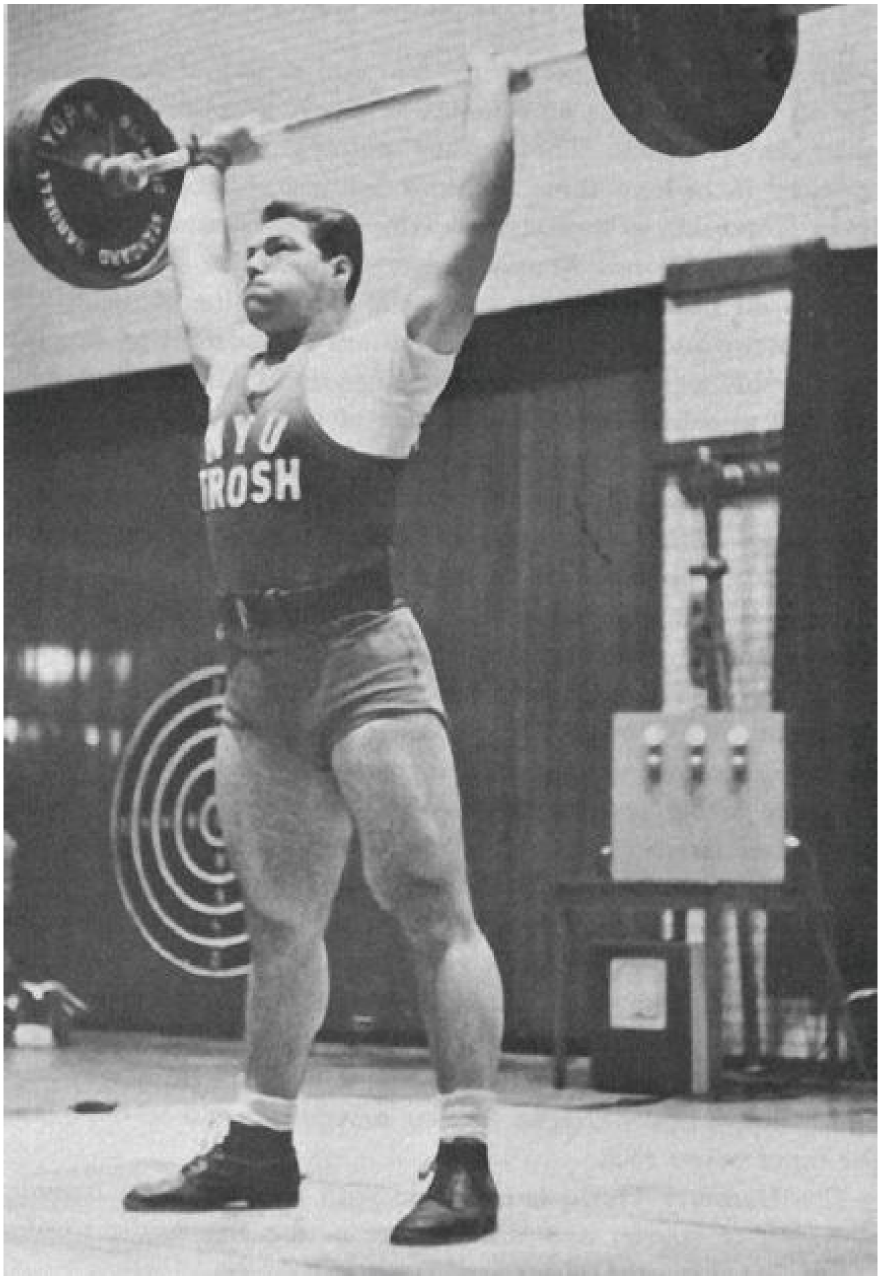
Perform this session twice per week, alongside regular powerlifting workouts

- Push each rep as hard as possible—100% effort
- Rest 1-2 minutes between holds: until full strength has returned
- Use Load Mode. Begin this cycle with 90% of your goal deadlift weight: a weight *just above* your 1-rep max for barbell deadlifts (i.e., a weight level you are stuck on)
- For deadlifts under 400lbs, add 10lbs to the load every time you achieve the full 6 x 3 seconds; for deadlifts over 400lbs, add 20lbs
- By the time you achieve 130% of your goal deadlift weight, you should have mastered the sticking point with that load and your goal deadlift should be attainable

- *This approach can be performed twice per week without interfering with regular in-gym training. It is best performed 3+ hours after a regular in-gym training method, but not on a day prior to a deadlifting session, in case it hinders performance with live weights.*

- *Due to the accommodation effect found in all specific resistance training protocols, it's wise not to over-use this technique. It's a "big gun", so bring it out of the bag only once or twice a year during a serious training plateau.*

WEIGHTLIFTING AND ISOS



***Champion Gary Gubner is an example of an isometrically-trained strength athlete*.**

Imagine this for a moment. All the major muscles in the body can be strengthened with less than one minute's work a day. In fact, if you only

followed the routine every other day, you would be more than pleased with the results.

-Alistair Murray, *Modern Weight Training*

For most of the strength world, Olympic weightlifting—with its two movements, the clean and jerk, and the snatch—is still seen as the pinnacle of strength and power. Throughout the 20th century, numerous weightlifting coaches adopted isometric protocols as assistance drills for their athletes. Possibly the most outspoken (and well-respected) of these figures was Alistair Murray. From World War II onwards, Murray was considered Europe's finest weightlifting coach, a state of esteem which he held for nearly thirty years. While American coaches focused on power-rack isometrics, Murray was a vociferous proponent of chain-and-bar methods, and even exploited early devices with mechanical dynamometers in training his Olympic athletes. Murray was a true genius of strength, and unquestionably decades ahead of his time.

		Reps	Duration
DAY ONE:	1. Deadlift (bottom position)	1	4 seconds
	2. Deadlift (middle position)	1	4 seconds
	3. Shrug	1	4 seconds
	4. High pull	1	4 seconds
	5. Front squat (bottom position)	1	4 seconds
	6. front squat (top position)	1	4 seconds
	7. Overhead press (bottom position)	1	4 seconds
	8. Overhead press (top position)	1	4 seconds
	9. Bent row (bottom position)	1	4 seconds
	10. Bent row (top position)	1	4 seconds
	11. Biceps curl (bottom position)	1	4 seconds
	12. Biceps curl (top position)	1	4 seconds

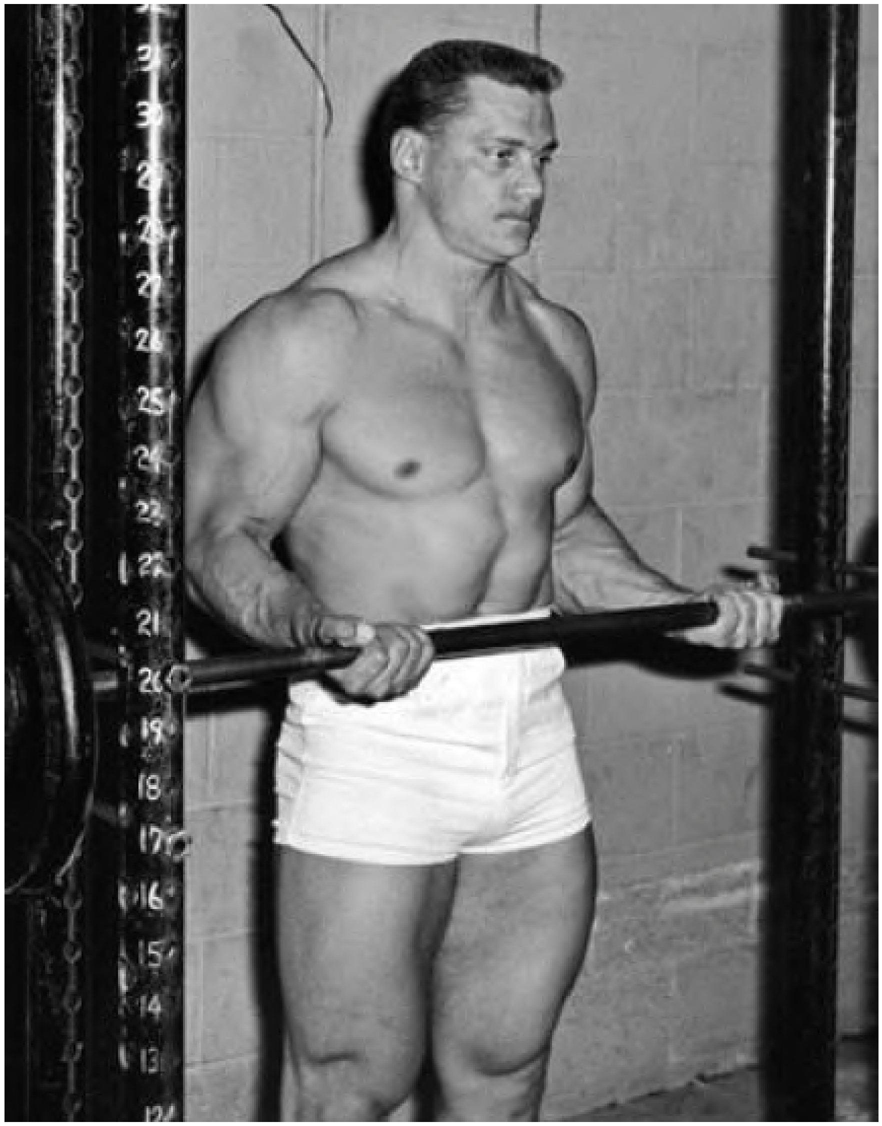
Repeat up to 7 days per week

- Push each rep as hard as possible—100% effort
- Rest long enough between repetitions to feel fresh enough to continue
- To make this protocol measurable, use Feedback Mode and record average loads and times of each repetition

- *Murray's system was based on holding two positions (close to bottom and close to top, but not quite) for six basic drills, focusing primarily on holds mirroring weightlifting movements: deadlifts, shrugs, high pulls, front squats and presses.*

- *Murray felt that it was important to keep total hold volume low to avoid fatigue. He recommended a 48-second total limit for active weightlifters (above), and a 60 second limit for isometrics-only athletes (i.e., the same workout as above, but with 5 second holds). For isometrics-only athletes, Murray also advised the addition of explosive jumps, and dips between chairs.*

STATIC CONTRACTION TRAINING



Bill March famously used isometrics to boost his bodyweight.

…It should be clear that the brain, when recruiting muscle fibers, doesn't concern itself with issues of velocity—only force requirements.

-Peter Sisco and John Little, *Static Contraction Training*

The 1990s were a revolutionary time in bodybuilding. After decades of programs locked into similar set-and-rep schemes, a handful of exercise ideologists were beginning to question the orthodoxy. Two of the most successful of these iconoclasts were Peter Sisco and John Little. Seen by many as heirs of the infamous High-Intensity master Mike Mentzer, Sisco and Little were already challenging ubiquitous concepts like the idea that to get bigger, athletes should train more often, use multiple sets, and eat high protein diets. These challenges were considered heretical at the time, but these men took their heresy even further, and began questioning range-of-motion. They asked —to get bigger, do athletes need to perform full repetitions? This question was considered sacrilegious, but Sisco and Little tested it, anyway. What they discovered sent shockwaves through the bodybuilding world: not only do athletes not require full ROM to gain strength and muscle, but they don't need any motion at all. Some of their subjects gained nearly thirty pounds of muscle in ten weeks, simply using heavy static holds.

		Reps	Duration
MONDAY:	1. Bent-over row	1	5-15 seconds
	2. Shrug	1	5-15 seconds
	3. Overhead press	1	5-15 seconds
TUESDAY:	Off		
WEDNESDAY:	Off		
THURSDAY:	Off		
FRIDAY:	1. Front squat	1	5-15 seconds
	2. Triceps extension or chest press	1	5-15 seconds
	3. Biceps curl	1	5-15 seconds
SATURDAY:	Off		
SUNDAY:	Off		

- Use absolute maximum intensity on all holds
- Take as much rest as you need between drills to feel fully recovered

- Use Load Mode to establish a Target Load, and time your reps

- *Begin each drill with a load you can only hold for approximately 5 seconds before your muscles fail. Each workout try to add a little time to your holds.*

- *When you can hold that load for 15 seconds, increase the load by 15-30% and repeat.*

- *Sisco and Little advised holds in the strongest range-of-motion; however they advised going just shy of locking your muscles out, to ensure that stress stayed on the muscles rather than shifting to the skeletal system.*

- *Static Contraction Training was intended to be performed with conventional equipment and a spotter, to permit load measurement; this Isochain workout is inspired by Sisco and Little's method.*

FUNCTIONAL ISOMETRIC CONTRACTION: Hoffman's Classic "Big 8"

Mr America Vern Weaver was one of Hoffman's athletes.

...Many experiments or demonstrations have proven that the single maximum static resistance movements have produced better results than the great many tiring, time-consuming, energy-sapping movements.

-Bob Hoffman, *Functional Isometric Contraction*

No discussion of isometrics could ever be complete without a mention of Bob Hoffman; weightlifting coach of the American Olympic team, and arguably the single biggest figure behind the growth of strength training in the 20th century. In addition, Hoffman was the man who did more to promote isometrics to athletes—and the world at large—than anyone else in history. In light of the modern science, some of his approaches seem incorrect; for example, his advice that only one isometric hold per drill brings best results. Whatever the science says, Hoffman's work deserves respect. He was not only the greatest advocate of isometrics of the modern era; his isometric methods also produced world beaters. One of his proteges was Louis Riecke, who went on to become a world record holder using Hoffman's method. The program opposite is patterned on Reicke's.

		Reps	Duration
DAY ONE:	1. Shoulder press (top position)	1	6-12 seconds
	2. Shoulder press (bottom position)	1	6-12 seconds
	3. Calf raise	1	6-12 seconds
	4. High pull	1	6-12 seconds
	5. Front squat (middle position)	1	6-12 seconds
	6. Shrug	1	6-12 seconds
	7. Deadlift (middle position)	1	6-12 seconds
	8. Front squat (top position)	1	6-12 seconds

Repeat 4-6 days per week

- Warm up with light calisthenics
- Begin and end each session with one set of abdominal work (preferably hanging from a bar) to stretch and align the spine
- Push each rep as hard as possible—100% effort

- Rest only long enough between drills to catch your breath

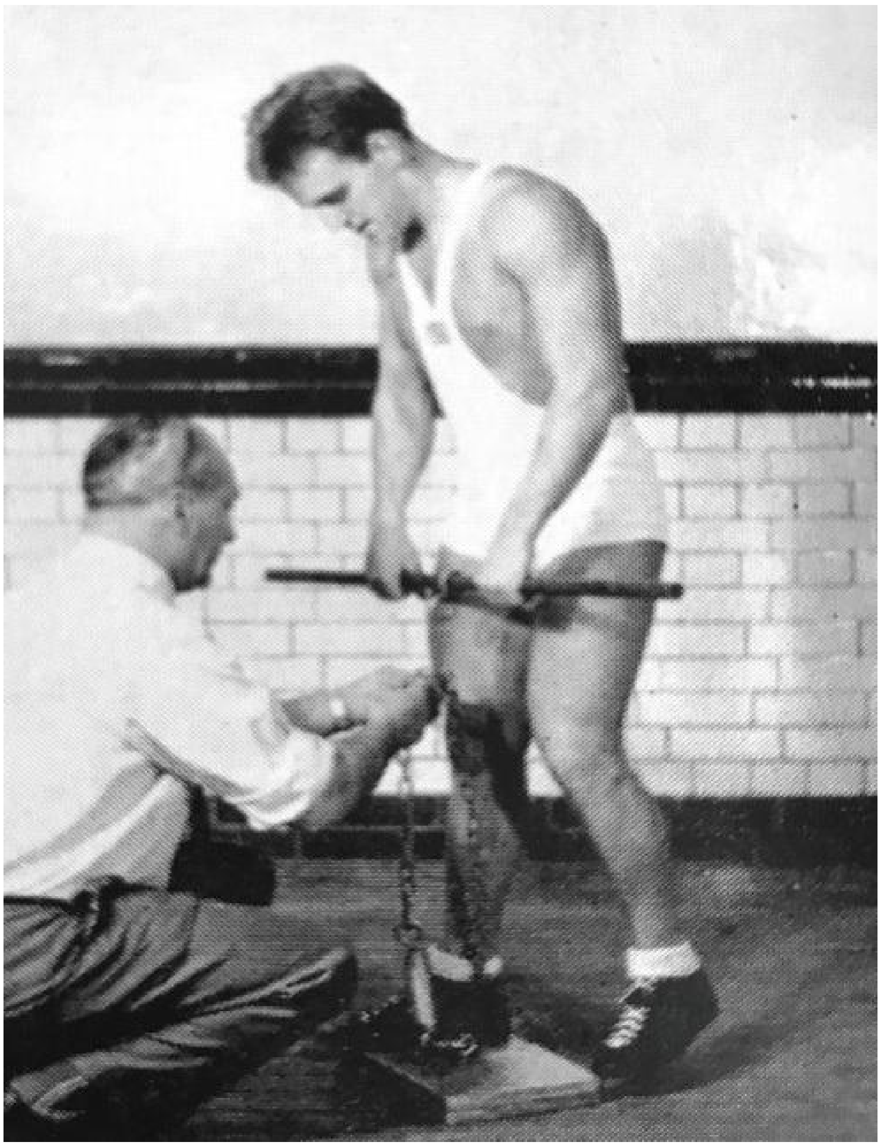
- Use Load Mode and record Target Loads and times of each repetition

- When a drill begins to feel less than maximum, add 5-10lbs

- *Hoffman advised that strength athletes perform isometrics up to 6 days per week, and perform dynamic movements—barbell, dumbbell, cable and bodyweight strength exercises, etc.—one day per week.*

- *The above protocol is based on Louis Riecke's advanced program; Hoffman also recommended other programs suitable for all athletes. One he endorsed was "Three Threes"—three positions each of a knee-bend (squat), a clean pull and shoulder press. He also felt that a program of two squat positions, two clean pull positions, two press positions, plus one calf raise and one shrug worked well.*

VERTICAL SETS: An ergonomic isometrics technique



Olympic weightlifting coach adjusts a chain-and-bar device, circa 1963.

If you are wondering about hitting a limit poundage—don't. I do not believe there is one!

-Bill March (World Championships gold medalist) on Isometrics

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"Vertical sets" is a method of total-body training designed specifically with the Isochain in mind. It allows an athlete to work the entire body, very thoroughly—with seven movements—but with minimal fuss and in a short space of time (around 20 minutes). The idea is to begin your training session with your bar set at the lowest level you will need, and gradually re-attach the chain further up with each different exercise. This is a very convenient way to use the Isochain and saves the hassle of having to reposition the handle up and down frequently. Since the levels of some exercises overlap, the athlete only actually has to change the handle position three times during the entire 7 drills. This method works all the muscle groups, however it's longer than most isometric workouts, and should be reserved for an athlete with several months training under his or her belt.

		Reps	Duration
DAY ONE:	1. Deadlift	6	6 seconds
	2. Bent-over row (same level as deadlift)	6	6 seconds
	3. Shrug	6	6 seconds
	4. Biceps curl	6	6 seconds
	5. Front squat (same level as biceps curl)	6	6 seconds
	6. Overhead press	6	6 seconds
	7. Triceps extension (same level as press)	6	6 seconds

Repeat Day One on Monday, Wednesday, Friday

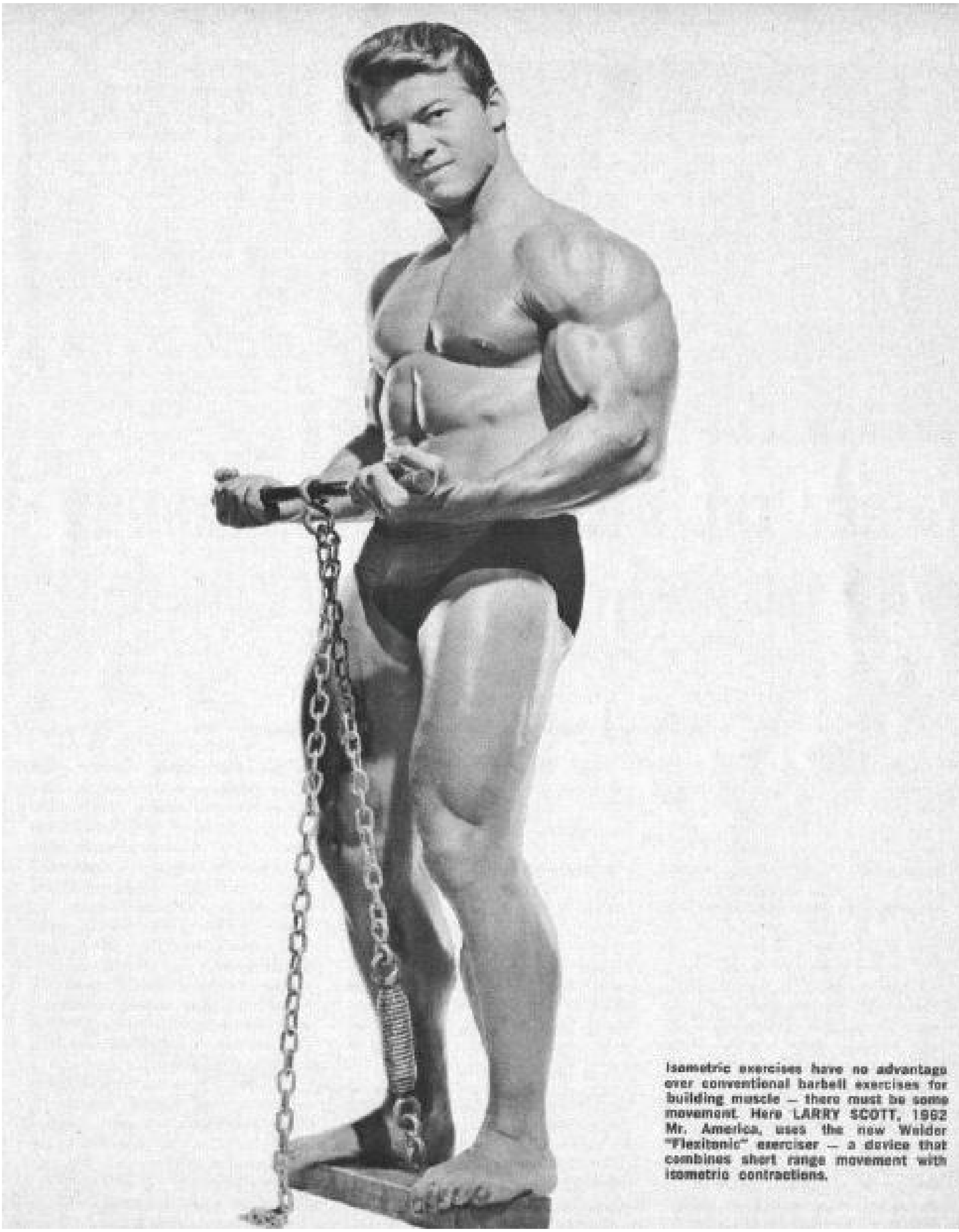
- Push each rep as hard as possible—100% effort
- Rest 20 seconds between repetitions
- Use Timed Mode and record Target Loads in your training journal

- *The above schedule is just one way to use the technique of*

vertical sets. There are others. You can also apply the tactic of using the same bar level for different exercises in other workouts; deadlift height can work for rows, rows can work with straddle lifts, curls can work for front squats and reverse curls, low-level presses can work with calf raises, etc. Experiment with the different drills and your own biomechanics. (And always make notes.)

- *One excellent way to improve on this workout is to stretch your target muscle groups vigorously during the rest between reps; stretch the back after the deadlift, the biceps after curls, etc. Perform a statically-held stretch for the full 20 seconds. This will not only increase your flexibility and joint health, but it makes the workout unbelievably efficient: for the full 20 or so minutes of your workout, you are doing something productive for your conditioning and fitness. Not a second is lost. That's incredible!*

ISOMETRICS FOR BODYBUILDING SPECIALIZATION



Bodybuilding's first Mr Olympia, the great Larry Scott, experiments with isometrics.

An intense isometric contraction is great for muscle growth. It quickly recruits the largest motor units because it's a maximum voluntary contraction. Plus, isometrics increase the neural drive between the motor cortex in your brain and the trained muscle.

-Dr Chad Waterbury

Of all the bodybuilding writers who have taken bodybuilding seriously, Dr Chad Waterbury's approach is one of the most intelligent. A bodybuilding coach at heart, Waterbury turned to isometrics as a means of boosting muscle growth after observing the calf musculature of ballet dancers. It's a truism in bodybuilding that calves are notoriously difficult to develop, but Chad noticed that the dancers all had amazing, muscular calves: developed by isometrically standing en pointe for hours on end. Chad reasoned that he could apply the same principles to bodybuilding to generate explosive growth in lagging muscle groups—and his experiments payed off enormously. If you are a bodybuilder, you owe it to yourself to give Dr Waterbury's specialization method a try: even if you have no intention of substituting your weights for isometrics anytime soon.

		Reps	Duration
EXAMPLE 1: CALF SPECIALIZATION			
DAY ONE:	1. Calf raise	5	10 seconds
EXAMPLE 2: BICEPS SPECIALIZATION			
DAY ONE:	1. Biceps curls	5	10 seconds
EXAMPLE 3: TRAPEZIUS SPECIALIZATION			
DAY ONE:	1. Shrug	5	10 seconds

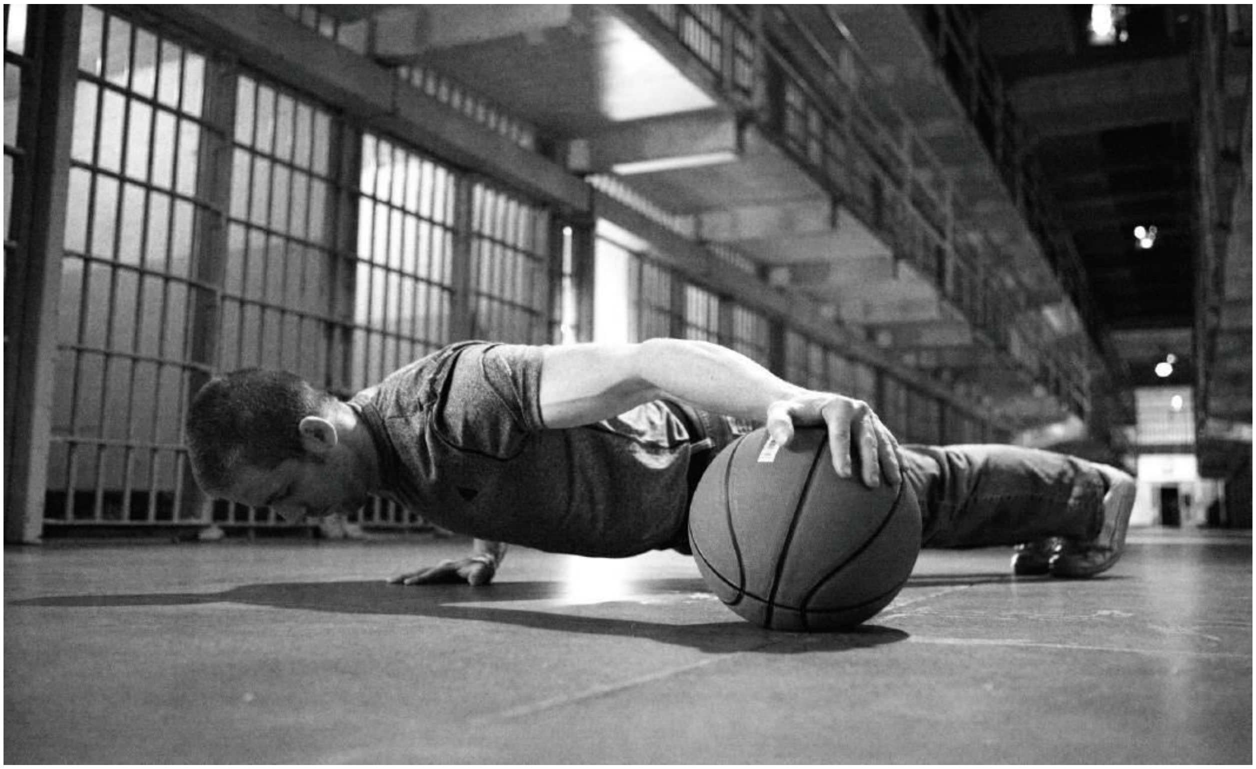
Perform these mini-sessions at least six hours after your regular workouts—preferably on a different day

- Use 100% effort

- Rest 2-3 minutes between reps
- Use Feedback Mode and record average loads and times of each repetition

- *These examples are inspired by Dr Waterbury's approach and although only three samples are given, the exact same principles (5 sets of 10 seconds maximum contraction, 2-3 minutes between reps) can be applied to any lagging muscle. It's probably best to specialize on just one muscle at a time, however.*
- *This program calls for the tightest contraction possible—perform all drills with the target muscles as close to full "squeeze" as you can.*
- *Chad advised bodybuilders to make progress by increasing the frequency of these mini-sessions. Begin with two specialization sessions per week (as well as your regular training routine), and add a mini-session every other week, until you reach 4-6 per week.*

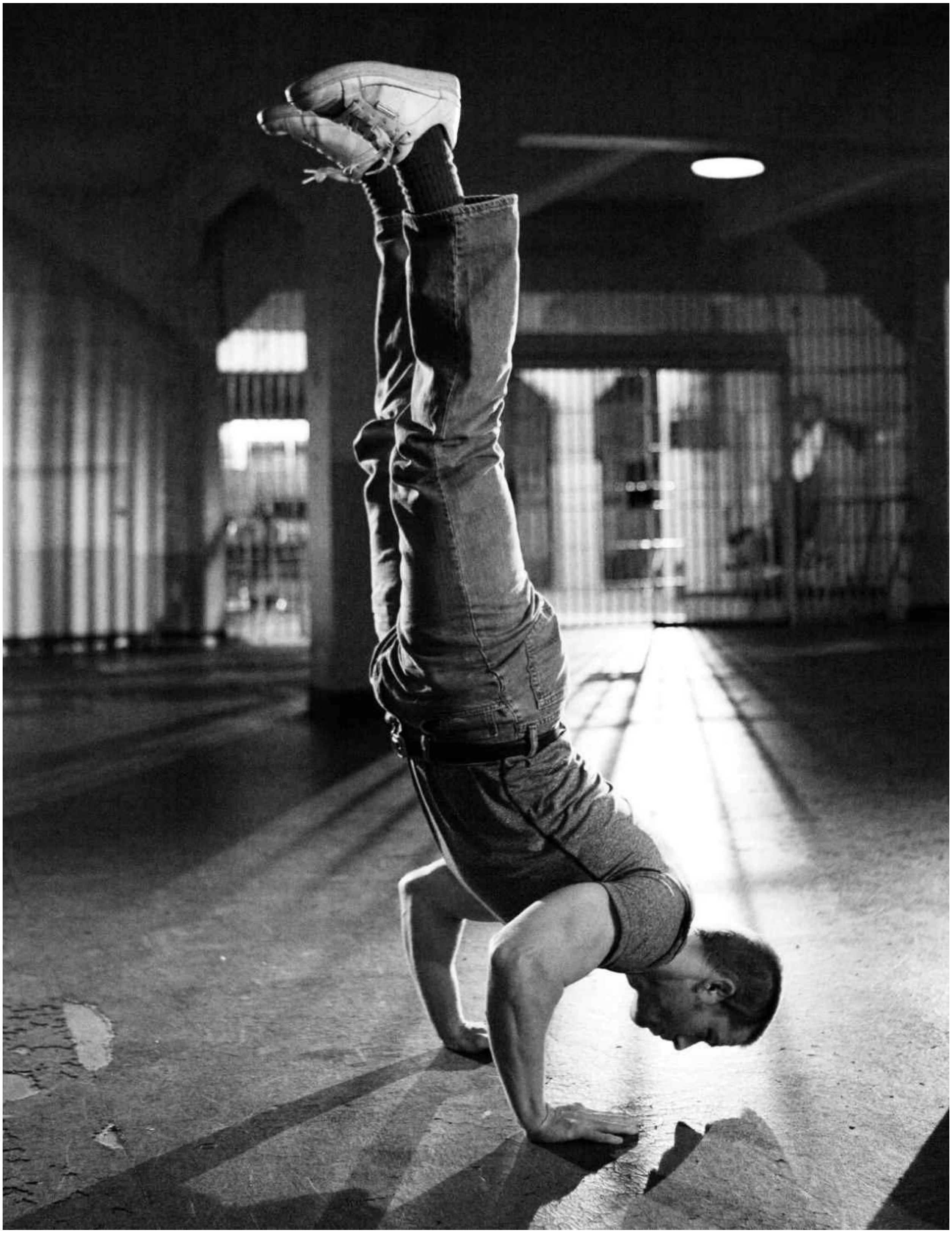
ISOMETRICS AND BODYWEIGHT



Convicts have been pulling on the bars of their cells to build strength for hundreds of years. If you are creative, you can use solid bars to give yourself a full body isometric workout.

-Paul Wade, *Convict Conditioning*

Not all isometrics aficionados come from the world of weight-training; gymnasts and calisthenics athletes have been exploiting isometric holds intuitively for centuries. But how do you combine bodyweight isometrics and Isochain training? What about bodyweight isometrics and classic bodyweight dynamics, such as push-ups and pull-ups? What about combining all of these? The solutions are presented in the next four templates.



OPTION A: Bodyweight and Isochain isometrics i

		Reps	Duration
DAY ONE:	1. Back lever progressions		
	2. Front lever progressions		
	3. Human flag progressions		
DAY TWO:	1. Deadlift	4	6 seconds
	2. Deadlift (alternate position)	4	6 seconds
	3. Front squat	4	6 seconds
	4. Front squat (alternate position)	4	6 seconds
	5. Biceps curl	6	6 seconds
	6. Shoulder press	6	6 seconds
DAY THREE:	1. Elbow lever progressions		
	2. handstand progressions		
	3. L-hold progressions		
DAY FOUR:	Same as Day Two		

Repeat, or take a day off

- For the Isochain drills, use 100% effort in Timed Mode
- For the Isochain drills, rest 20 seconds between holds
- or the bodyweight isometric protocols/progressions see Part V

- *This protocol is very simple; you have a day when you perform your bodyweight bar exercises (Day One) and a day when you perform your bodyweight floor exercises (Day Three). In-*

between those days, you insert a basic Isochain workout. Because the bodyweight holds primarily work the trunk and torso, the lower body gets extra work on Days Two and Four.

- *Option A would work well for beginners, and those looking for all-round strength. Because of its purity—which lends itself to focus—it is also an excellent approach for advanced lifters, looking to on total-body strength.*

OPTION B: Bodyweight and Isochain isometrics ii

		Reps	Duration
DAY ONE:	1. Back lever progressions		
	2. Front lever progressions		
	3. Human flag progressions		
DAY TWO:	1. Elbow lever progressions		
	2. handstand progressions		
	3. L-hold progressions		
DAY THREE:	1. Deadlift	4	6 seconds
	2. Deadlift (alternate position)	4	6 seconds
	3. Front squat	4	6 seconds
	4. Front squat (alternate position)	4	6 seconds
	5. Biceps curl	6	6 seconds
	6. Shoulder press	6	6 seconds

Repeat (take a day off when required)

- For the Isochain drills, use 100% effort in Timed Mode
- For the Isochain drills, rest 20 seconds between holds
- For the bodyweight isometric protocols/progressions see Part V

- *Unlike Option A—which was more even—Option B has twice as many bodyweight days as Isochain sessions. Day One is bodyweight bar techniques; Day Two is bodyweight floor*

techniques; and Day Three is Isochain drills.

- *As a result of the added bodyweight frequency, Option B will work better for an athlete who is more advanced, or who is looking to progress faster through the bodyweight skills—perhaps only using the Isochain as an ancillary method to increase total-body power. On the downside, progress in the Isochain drills will be slower than in Option A.*

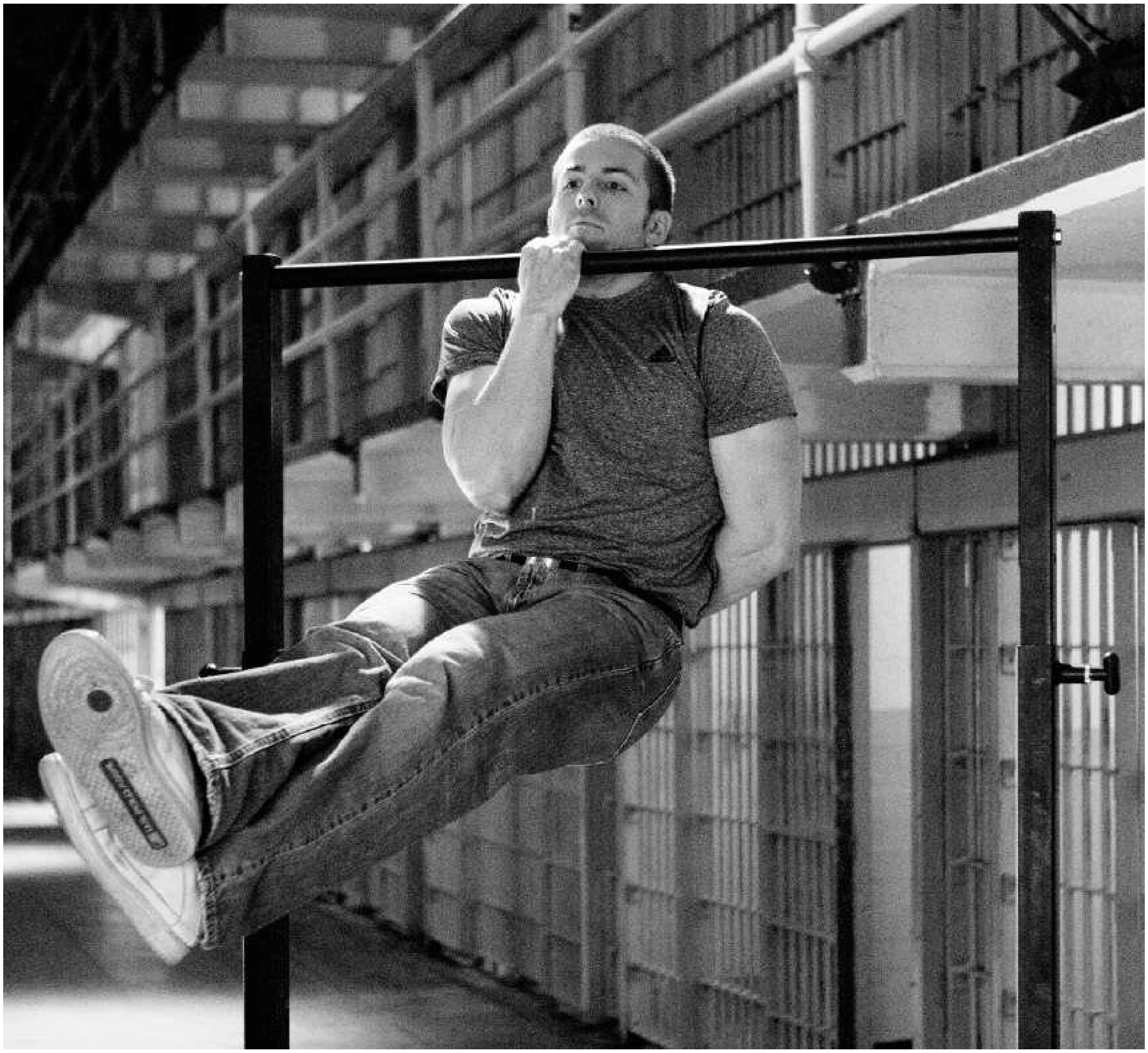
OPTION C: Isochain isometrics and bodyweight isometrics/dynamics

		Reps	Duration
DAY ONE:	1. Back lever progressions		
	2. Front lever progressions		
	3. Human flag progressions		
	4. Pull-ups (dynamic)		
DAY TWO:	1. Deadlift	4	6 seconds
	2. Deadlift (alternate position)	4	6 seconds
	3. Biceps curl	6	6 seconds
	4. Shoulder press	6	6 seconds
	5. Bodyweight squats (dynamic)		
DAY THREE:	1. Elbow lever progressions		
	2. handstand progressions		
	3. L-hold progressions		
	4. Push-ups (dynamic)		
DAY FOUR:	1. Front squat	4	6 seconds
	2. Front squat (alternate position)	4	6 seconds
	3. Biceps curl	6	6 seconds
	4. Chest press	6	6 seconds
	5. Bridges (dynamic)		

Take a day off, or repeat and take a day off after 2nd cycle

- For the Isochain drills, use 100% effort in Timed Mode
- For the Isochain drills, rest 20 seconds between holds

- For the bodyweight isometric protocols/progressions see Part V



One-arm pull-up

- *This protocol is designed for an athlete who wants to improve equally in bodyweight and Isochain isometrics, but still wishes to include some dynamic calisthenics (e.g., pull-ups, push-ups) in their training.*
- *Day One is bodyweight bar isometrics. Following the skill work, perform one warm-up set of pull-ups for 10 reps, then a*

hard "work" set for 5. After the work set, a burn-out set with an easier progression (for up to 20 reps) is optional to finish the workout. On Day Three, perform the bodyweight floor isometrics, and follow the same procedure with push-up progressions as you did for pull-ups on Day One. Bodyweight squats (pistol progressions) are added at the end of Day Two, and bridges on Day Four—all following the same protocol (one warm-up set of 10, a work set of 5, and an optional burn-out set).

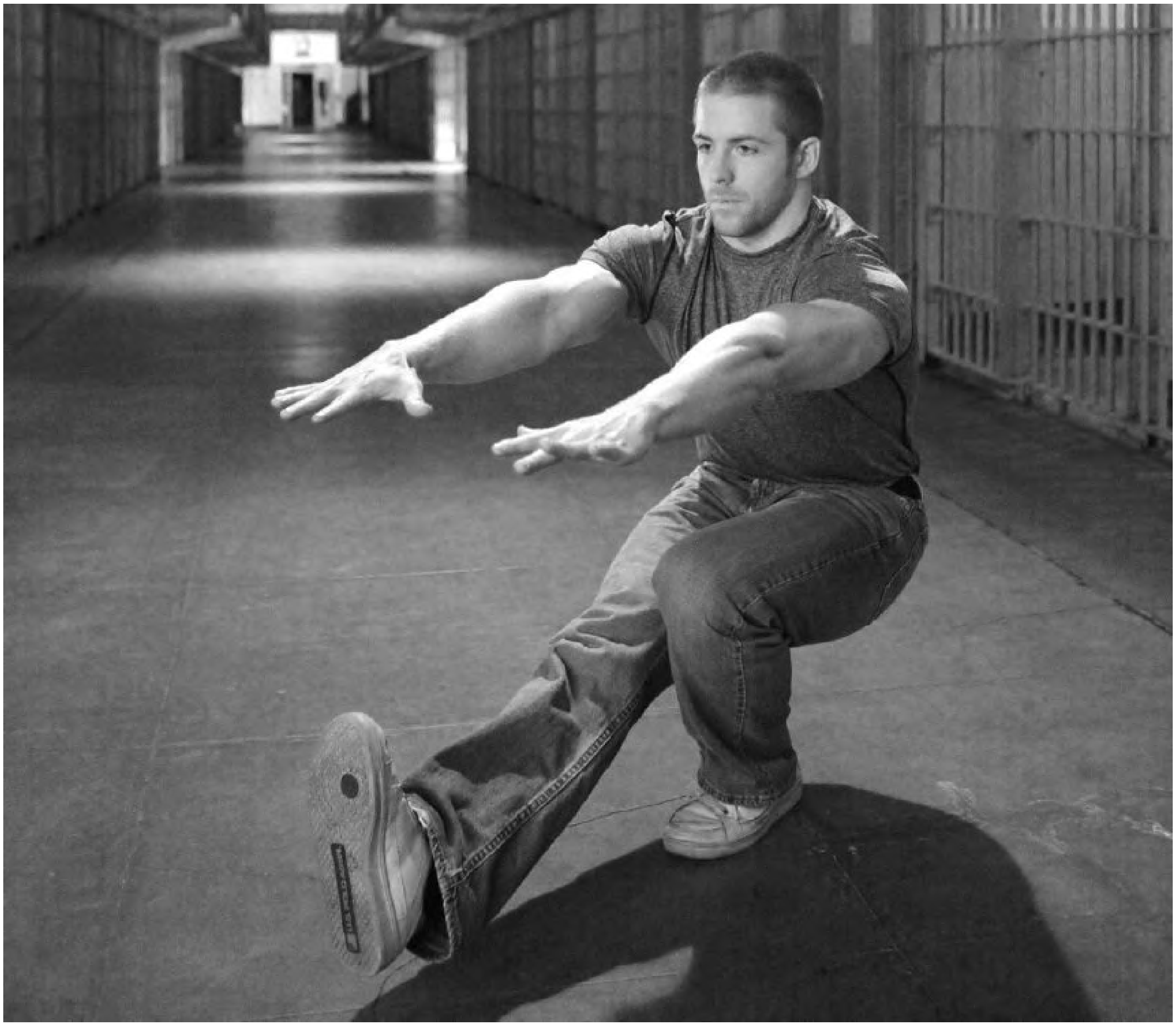
- *For bodyweight dynamics progressions, refer to* Convict Conditioning*, published by Dragon Door.*

OPTION D: Isochain isometrics and bodyweight dynamics

		Reps	Duration
DAY ONE:	1. Handstand push-up progressions (dynamic)		
	10-minute break/mobility work		
	2. Push-up progressions (dynamic)		
DAY TWO:	1. Deadlift	6	6 seconds
	2. Deadlift (alternate position)	6	6 seconds
	3. Shoulder press	6	6 seconds
	4. Abdominal work/leg raise progressions (dynamic)		
DAY THREE:	1. Pull-up progressions (dynamic)		
	10-minute break/mobility work		
	2. Bodyweight squat progressions (dynamic)		
DAY FOUR:	1. Front squat	6	6 seconds
	2. Front squat (alternate position)	6	6 seconds
	3. Biceps curl	6	6 seconds
	4. Bridges (dynamic)		

Take a day off, or repeat and take a day off after 2nd cycle

- For the Isochain drills, use 100% effort in Timed Mode
- For the Isochain drills, rest 20 seconds between holds
- For the bodyweight isometric protocols/progressions see Part V



One-leg squat

- *Option D is for the athlete utilizing the Isochain who has no interest in bodyweight isometrics, but only dynamics—for example, the dynamic "Big Six" of* Convict Conditioning *(push-ups, pull-ups, handstand push-ups, leg raises, bridges and bodyweight squats).*

- *Day One and Three are exclusively calisthenics days; Day Two and Day Four are largely lower-body heavy Isochain sessions (the calisthenics days work the upper-body very hard) but finishing with some abdominal or spinal work to strengthen*

and align the spine.

- *For more information on the dynamic "Big Six", including performance, progressions and workouts, refer to* Convict Conditioning*, published by Dragon Door.*

- *The breaks built into Day One and Day Three would be an ideal time to perform some mobility drills; for example, the "Trifecta" described in* Convict Conditioning 2: Advanced Prison Training Tactics*, also published by Dragon Door.*

PART V

ISOMETRICS: BODYWEIGHT PROGRESSIONS

BY PAUL “COACH” WADE

The great thing about isometrics is that they train you to create full-body tension, which is really helpful anytime you are orking towards advanced calisthenics.

-Al Kavadlo SCSC, PCC Lead Instructor[1]

18. Introducing the Isometric "Big Six"

Darkness and gloom fill the blocks and cells of a maximum-security penitentiary. Lights out was over an hour ago, but the silence is constantly broken by wails and threats—even screams. One young man ignores this intimidating punctuation. He refuses to sleep, or sit in silent contemplation about where things went wrong. Instead, he lies prone on the dirty floor, his limbs trembling as he pushes his body up one more time. There are no reps, no sets tonight. Just pain and fire.

The pushups destroyed, he heads to the corner of his shadowy cell. Placing his palms against the chipped paintwork, he pushes against both walls like Samson struggling to bring the temple down around the Philistines. After a few moments of unmoving agony, he relents, and returns to his pushups. The only sounds in the tiny, oppressive space are the short, strong exhalations he uses to power him through his twentieth set.

Exhausted but exhilarated, the inmate finishes up. He washes his face—now running with sweat—in the sink. He looks into the darkness where his mirror should be, and he is pleased: those weak souls who spent the night with their heads in their hands, swimming in pain and regret, will be weaker still when the sun comes up. He will be stronger.

I first began my bodyweight training journey when I was incarcerated in San Quentin in my early twenties. I have now been training, religiously, in

old-school calisthenics for longer than most of my readers have been alive. (Damn, in some cases for longer than their parents have been alive!) Although they were never the mainstay of my workouts, I regularly used isometric-type exercises during my cell training—all convict-athletes did, although we probably didn't call them by that name. We didn't have any equipment—but that's why we did it! We pulled against bars, pressed against walls, and pushed our hands against doorways in all kinds of angles until our muscles were on fire. What we did was not new—convicts have always embraced isos. One man considered the founder of modern isometrics is the famous old-time strongman, Alexander Zass. Although a great innovator, Zass didn't invent this type of movement-free training; he learned his methods while he was a prisoner during World War I. Shackled in his cell and concerned that he would lose the strength he needed to survive, Zass began pulling and pushing statically on the chains that bound him. Not only did this method *work*, it made him so ferociously strong that when the time was right, he was able to snap his manacles and bend the windows of his prison bars to escape to freedom. People have performed these kinds of exercises for centuries—thousands of years. They still do them in jails, because they work. I discuss some of these isometrics in my prison-training book, *Convict Conditioning.*

As well as these isos using architecture, we also performed bodyweight static holds. A popular one was Samson's Seat, where you sit against a wall with your knees at a 90-degree angle, and just hold for time. That beauty not only saves your knees from wear and tear, it also seriously pumps up those quads! In the same theme, you can also hold bridges, pushups, etc. My favorite form of statics are the harder, gymnastic-type holds which require a huge amount of discipline and work to perform; feats like the human flag or the front lever. In C*onvict Conditioning,* I included a static variant for every one of the Big Six dynamic exercises I detailed, but I couldn't include everything I wanted to due to lack of space. I get tons of emails and letters from calisthenics students all over the world, and one of the most popular questions has always been: *what's your take on isometrics?*

The isometric Big Six and the Ten Steps

In this manual I'm going to answer that question definitively. I'm going to present you with my "Big Six" isometric holds—each one an impressive feat of strength. These six are:

The Isometric "Big Six"

- **The elbow lever**
- **The L-hold (sometimes called the*L-sit*)**
- **The handstand**
- **The back lever**
- **The front lever**
- **The human flag (sometimes called the *side lever*)**

If you know anything about bodyweight training, you'll appreciate that this is an *incredible* roll-call of iconic strength feats. Any athlete who can perform all six of these movements will be almost super-humanly strong from head-to-toe; possess alien-like agility; and have tendons as indestructible and powerful as the legendary strongmen of yore. Soon, you'll be bending bars, kid. Just like Zass.

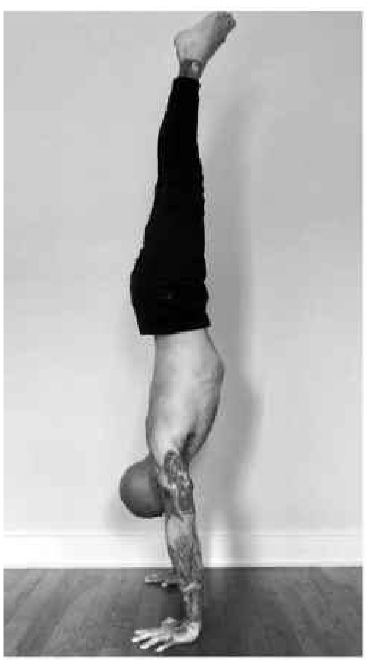
To many athletes—particularly those lacking a background in gymnastics—these six feats will seem intimidating: maybe even unattainable. I say, *no.* Any able-bodied person with enough discipline and commitment *can* achieve these skills. You just need to break them down into smaller, friendlier, more achievable techniques, and link these techniques together as a sequential chain—meaning you can begin with easy exercises and gradually work your way up to intermediate and advanced techniques over time. This is the heart of what's known as *progressive calisthenics*.* In this section of the manual, I will give you nine different techniques which will help you on your journey to each of the Big Six. Along with the final feats—known as Master Steps—these nine form the *ten steps*. Each step is also broken down into regressions—ways to make the step easier—and progressions—ways to make the step harder. Those of you familiar with my previous books (I love ya!) will

recognize this approach. (Patent Pending. Actually, no—I couldn't understand the paperwork the Patent Office sent me. You'd have to be a quantum physicist to understand that stuff.)

*If you want earn your "black belt" in progressive calisthenics, check out the PPC (Progressive Calisthenics Certification) workshop opportunities organized by Dragon Door, and instructed by the Kavadlo brothers—widely recognized as the greatest calisthenics instructors on the planet. Only for the dedicated. ***www.dragondoor.com/workshops/pccworkshop***








The isometric Big Six: elbow lever, L-hold (top row), back lever, front lever (middle row), handstand, human flag (bottom row).

How to train using bodyweight holds

If you've looked through the previous sections of this book, you'll have a pretty damn good grasp of isometric theory and practice, so I'm gonna keep the rest of this chapter short and sweet so we can roll straight to the progressions. What follows is a condensed masterclass of bodyweight isos. (Those geniuses looking for the advanced degree should get hold of a copy of the 600+ page *PCC Instructor's Manual*—currently available only through PCC workshops.)

HOW TO PROGRESS

HOW LONG?

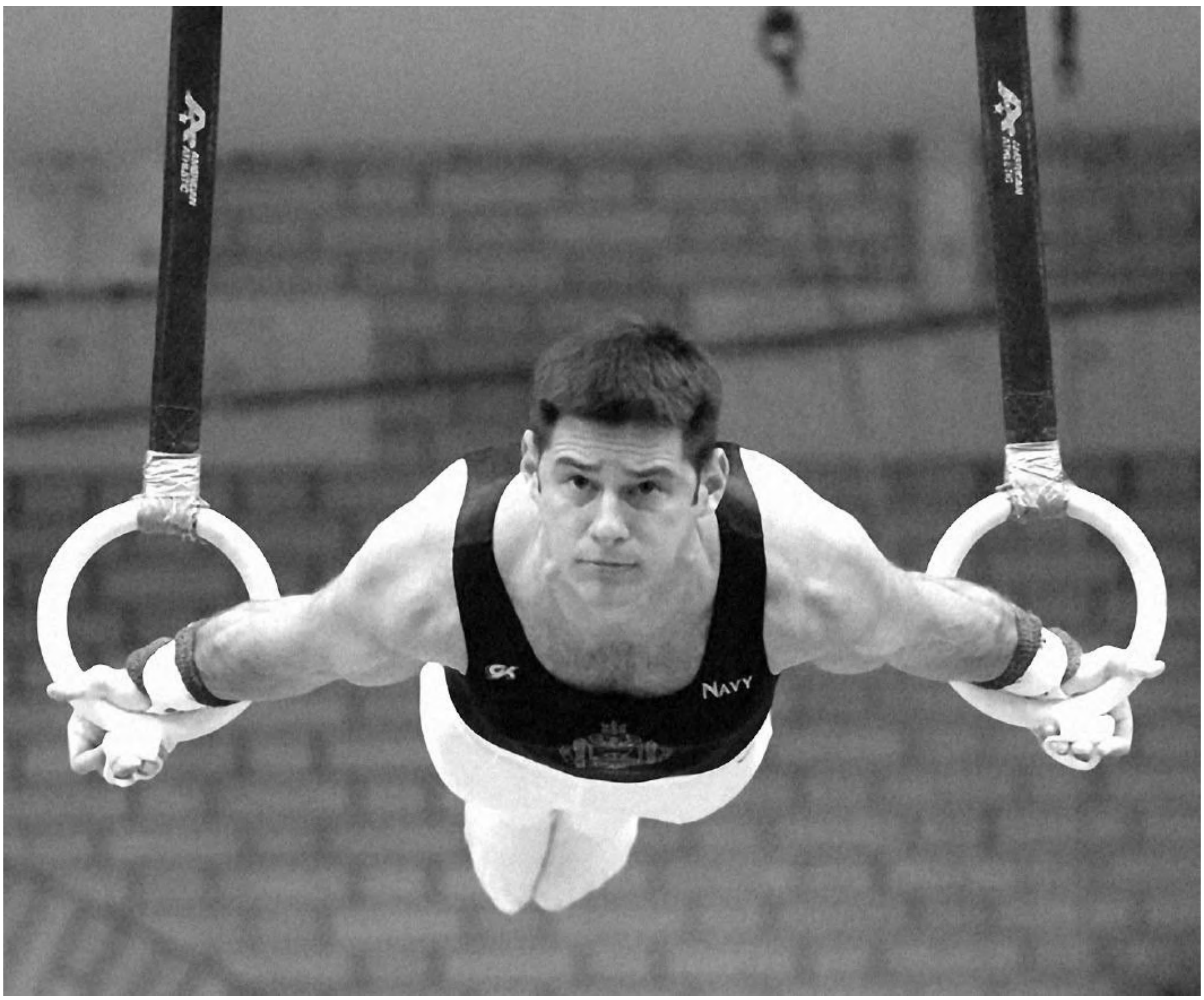
The progression standard for any bodyweight iso can be flexible. I advise:

- For steps 1-5, you should be aiming at a hold of approximately **ten seconds.**
- For steps 6-9 a *perfect* hold of **five seconds** is sufficient to move on to the next step. Once you can hold the position shown perfectly for five seconds, try the next step. For very difficult advanced progressions—front levers and press flags—**two-to-three seconds** is acceptable.

HOW MUCH?

During training, hold your best position until it starts to drop, or deteriorate. Then take a brief break (a couple minutes) and try again. Do this **five or six times** each session.

HOW OFTEN?	Training can be done on **three non-consecutive days per week.** If you are in great shape and motivated to master the holds, **alternate-day training** is an option. Never train while still sore from last time, though—it's pointless. Multiple bodyweight hold workouts are included in chapter 17, pages 336 to 341.



Bodyweight isometrics are an essential component of gymnastics Order of inclusion

You don't need to practice all of the Big Six at once. If you only want to work on a couple, or even one of the feats—maybe it's a move you always thought was cool—go for it. It's your training, nobody else's. But if you wish to work on *all six* eventually, I'd recommend beginning with just the elbow lever. The elbow lever is a perfect way to start bodyweight isos because it teaches several skills required for more advanced techniques: alignment, total-body tension, balance and hand strength. Once you've mastered elbow levers, add in handstand work and L-holds. When you've got to at least step 8 of those two, you'll be advanced enough to work with back levers. Once you're beyond step 5 of back levers, you can add front levers and human flag training if you want.

Breathing

Holding your breath can improve balance and endurance during bodyweight holds, but only in a minor way. I never encourage this approach. I advise my athletes to learn to breathe smoothly and regularly during all their training, *even with the body braced.* Learn this skill.

Warming up

Before working out, it's a good idea to warm your body up with some light calisthenics, joint circling, etc. I also advise two warm-up sets prior to the hard, "work" sets. If you have reached at least step 3 in your exercise, you can use steps 1 and 2 to warm up. If you haven't reach step 3, you can practice a regression of your current step, if you wish. Go by feel, and keep the warm-up work moderately easy; going too hard will impair your performance on the real stuff. If you feel the need for a cool-down, do it. I used to practice pacing around my cell, interspersed with some deep breathing while seated or standing. I never felt I needed anything else.

Avoiding plateaus

It's not uncommon to fully master one step, only to try to move on to the next step and find it too tough. Don't get discouraged. If this is you, explore these three options:

A. Stay with your previous best step and get even better at it. Get more workouts under your belt. Try holding it for longer, and for extra sets. If you could previously manage 5 seconds, try for 10 or even 15 before trying the next step again.

B. Stay with your previous step, but make it harder. Each step I include here is given at least one progression, but don't let this stop you from experimenting and finding more "hidden steps" yourself. After working with (and mastering) harder versions for a while, try the next step again.

C. Explore "consolidation training". If you have moved up to a step you can *just about* perform for a second or so, you can practice it with very high frequency to help your nervous system consolidate your wobbly performance pattern. Never push your muscles to the limit during this type of training, or that will limit your ability to train frequently—stay fresh. Understand also that consolidation training works rapidly, but comes with equally rapid diminishing returns; so use this tactic sparingly. The *PCC Instructor's Manual* lists three fundamental approaches to consolidation training:

5 x 10 hours	Perform a mini-session (1-3 reps) of the chosen exercise every two hours over a ten-hour period. *The ideal way to begin CT; productive without being excessive.*
10 x 10 hours	Perform a mini-session (1-3 reps) of the chosen exercise every hour over a ten-hour period. *An excellent approach for the athlete who can "slip away" on the hour, daily.*
10 x 5 hours	Perform a mini-session (1-3 reps) of the chosen exercise every half-hour over a five-hour period. *Would suit well-conditioned athletes who can only train during the evenings.*

PCC Instructor's Manual, chapter 28

Get it done

Before we hit the progressions themselves, one final point—avoid *dogmatism* in your training. Be flexible, mentally. While I love the progressions in this book, there are other systems and most of them work well. The *PCC Instructor's Manual* and *Convict Conditioning 2* each outline different human flag progressions to the ones listed here. I use different progressions for the L-Hold in *Convict Conditioning 2*. Sometimes slightly different terminology is used, also. Don't sweat it. Likewise, too many athletes today seem to practically *worship* training programs—don't. Focus, determination and effort are key—any program should be used as a template; a rule of thumb, not an iron-clad section of the Old Testament. Just formulate a plan and start banking strength by working damn hard and with consistency. All roads lead to Rome.

19. ELBOW LEVERS: Total-Body Control

ELBOW LEVER

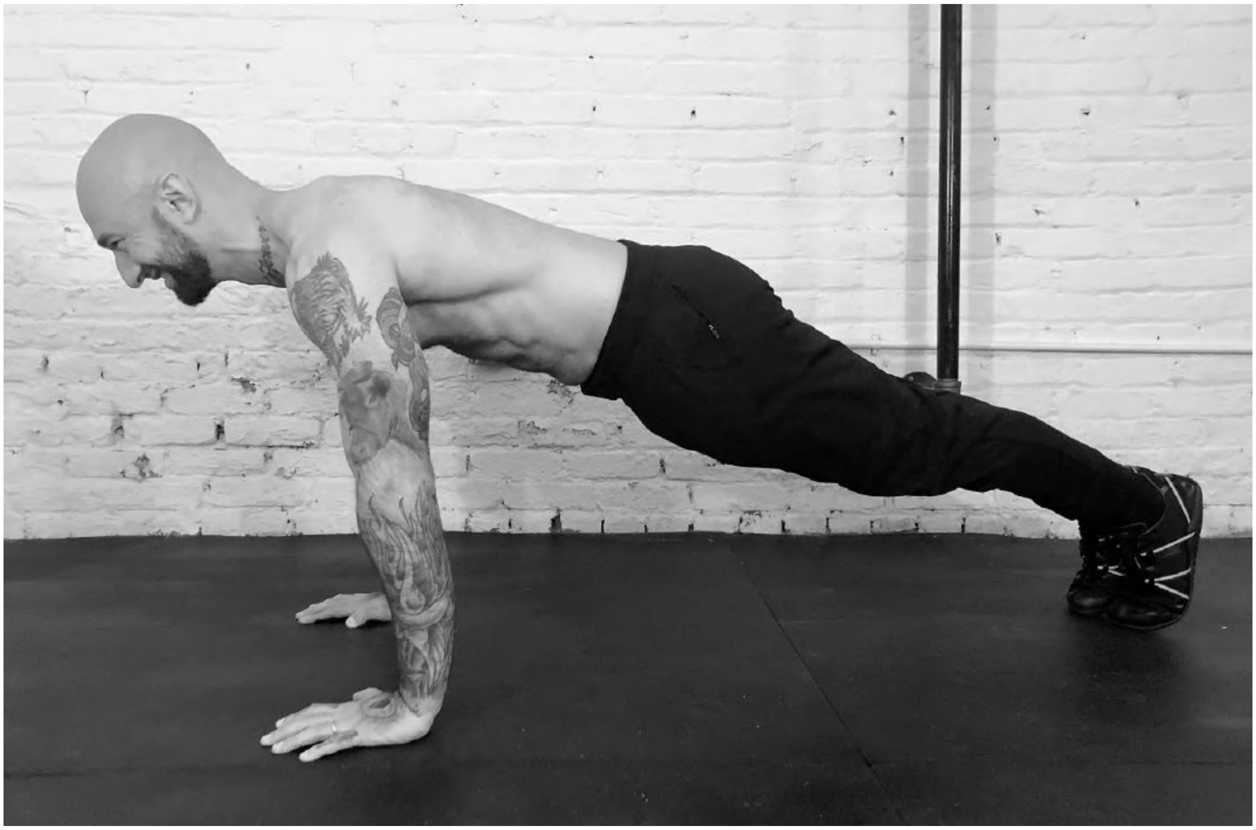
THE TEN STEPS

1. *Push-up plank*
2. *Classic plank*
3. *One-leg plank*
4. *One-arm plank*

5. ***Gecko plank***
6. ***Wall plank***
7. ***Wall elbow lever***
8. ***Raised elbow lever***
9. ***Split elbow lever***
10. ***MASTER STEP: Elbow lever***

Elbow levers are a perfect bodyweight hold for beginners to focus on. They teach athletes how to balance well, how to align the body, plus they strengthen the trunk, hands and wrists. If you only have time to learn one isometric hold, make it this one. Steps 1-5 are basic plank variations to strengthen the midsection for the harder exercises. From there, we make things harder by using the wall instead of the floor (step 6), and the athlete masters the elbow lever arm position (step 7). From there, leverage is increased step-by-step (7-9) until the Master Step is achieved.

STEP 1: PUSH-UP PLANK

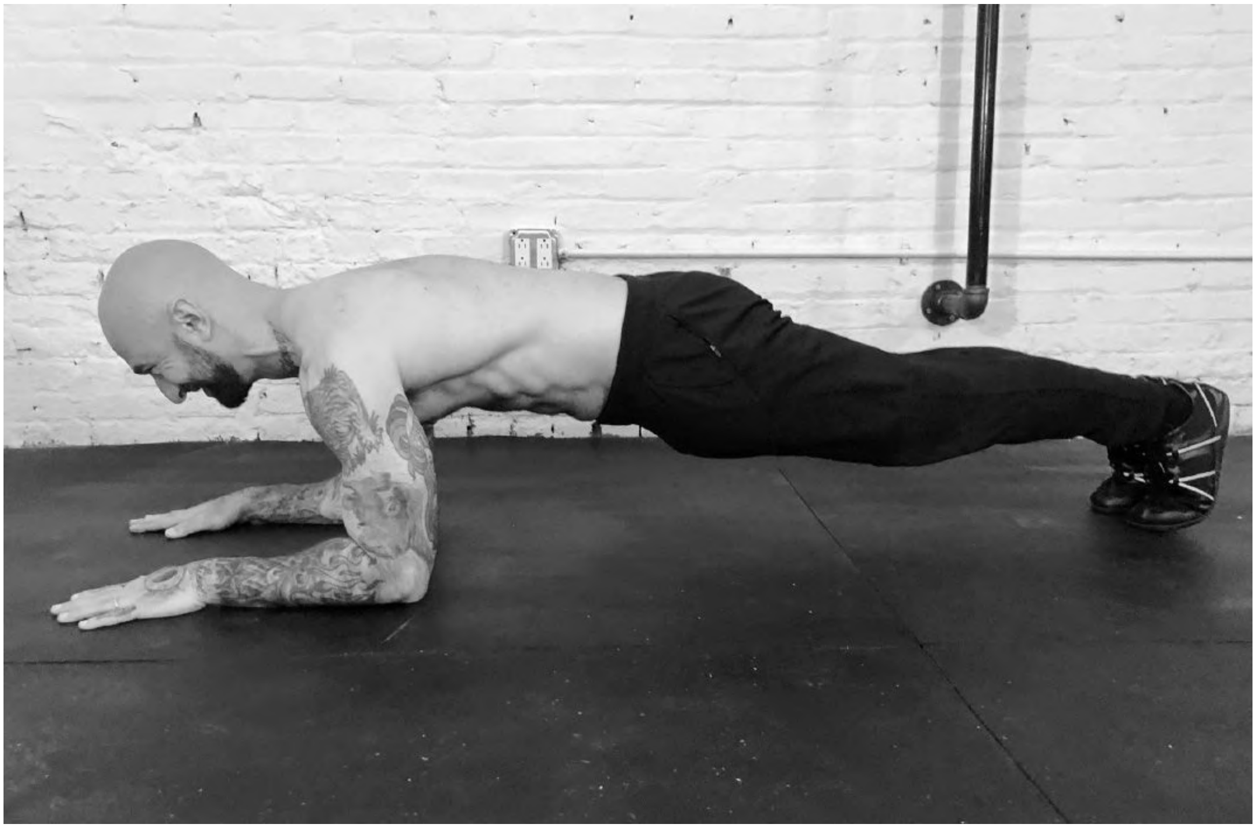


PERFORMANCE: Kneel down and place both palms on the floor, slightly closer than shoulder-width. Step your legs back behind you, resting on your toes and palms with the limbs locked and the body straight and aligned. Hold the position. Reverse the motion to complete the hold.

- During all of the *elbow lever* progressions, brace your body as strongly as possible when aligned—learning to generate tension while on the floor will ultimately make harder straight-body exercises (like hanging levers) easier.

REGRESSION: Inclining the body (by placing the hands on something higher than the feet) or resting on the knees rather than the toes will make this hold easier.

PROGRESSION: Placing the feet higher than the palms will make this hold harder.



PERFORMANCE: Kneel down and place both forearms on the floor, around shoulder-width apart. Step your legs back behind you, resting on your toes and palms with the limbs locked and the body straight and aligned. Hold the position. Reverse the motion to complete the hold.

- This bent-arm variation is probably the plank most athletes will recognize. The bent arms shift the center of gravity forward, making the hold slightly harder on the trunk and upper-body than the *push-up plank.*

REGRESSION: Inclining the body (by placing the hands on something higher than the feet) or resting on the knees rather than the toes will make this hold easier.

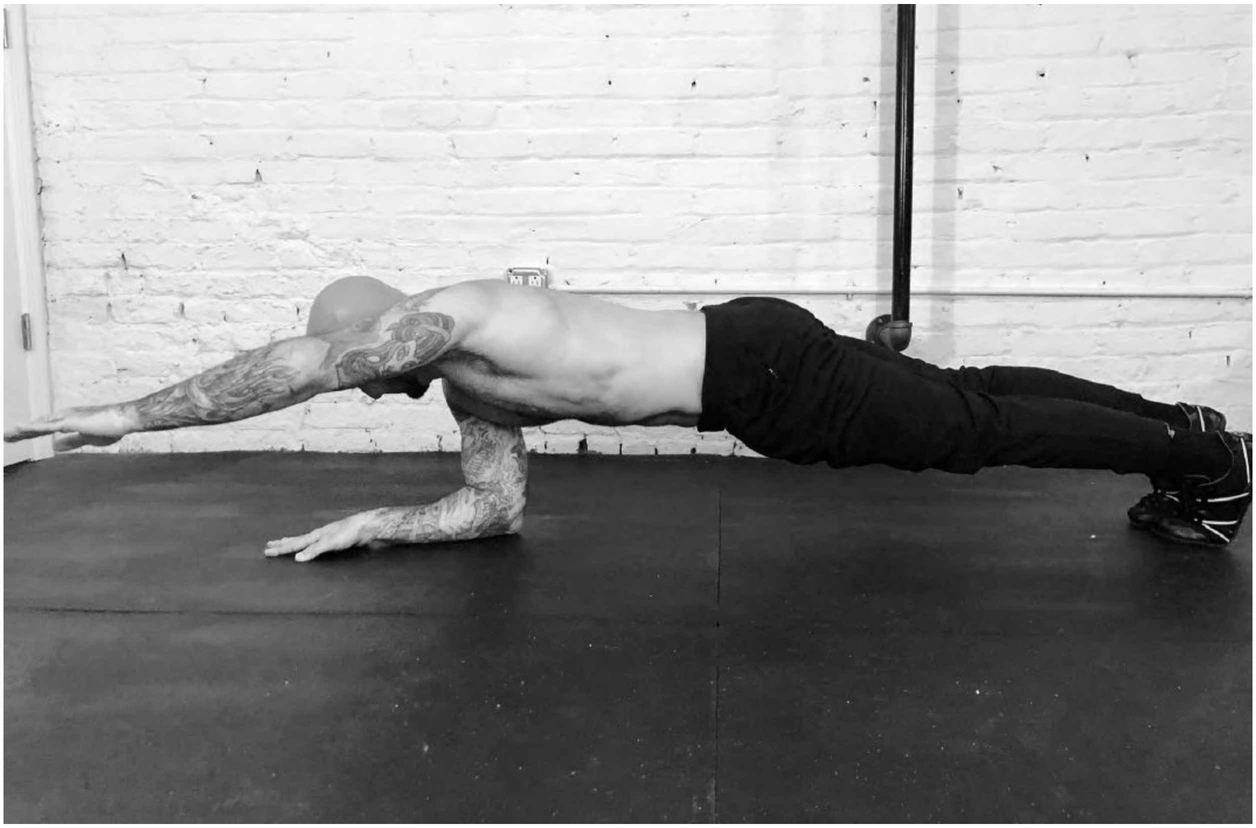
PROGRESSION: Placing the feet higher than the palms will make this hold harder.

PERFORMANCE: Kneel down and place both forearms on the floor, around shoulder-width apart. Step your legs back behind you, resting on your toes and forearms with the limbs locked and the body straight and aligned. Raise one leg up behind you, keeping it locked at the knee. Hold the position. Reverse the motion to complete the hold.

- As with all asymmetrical isometric exercises, remember to begin with your weakest side. Switch sides, performing both sides for equal periods.

REGRESSION: Placing the foot of the higher leg on the back of your other ankle will make this hold easier.

PROGRESSION: Placing the feet higher than the palms will make this hold harder.

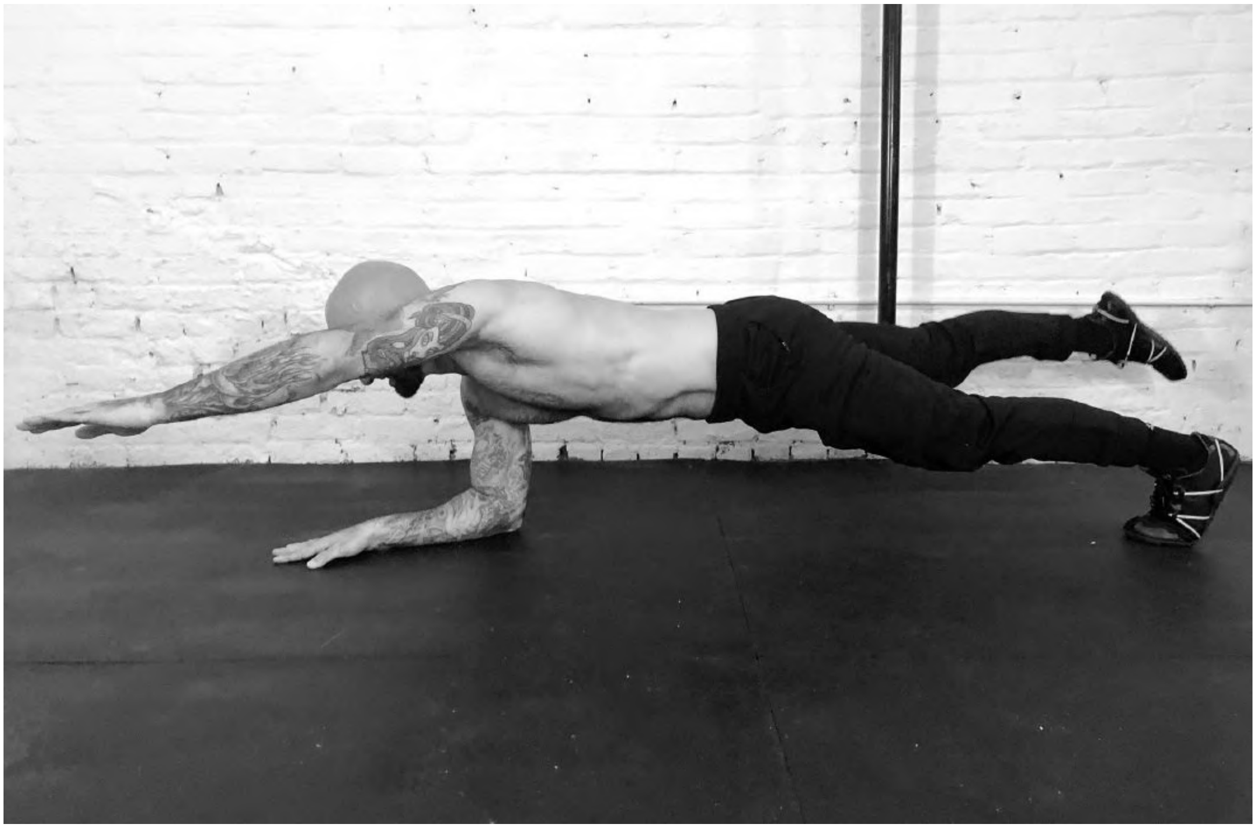


PERFORMANCE: Kneel down and place both forearms on the floor, around shoulder-width apart. Step your legs back behind you, resting on your toes and forearms with the limbs locked and the body straight and aligned. Raise one arm up and extend it out in front of you. Hold the position. Reverse the motion to complete the hold.

- As with all asymmetrical isometric exercises, remember to begin with your weakest side. Switch sides, performing both sides for equal periods.

REGRESSION: Resting your upper-body on one palm (push-up style) rather than the forearm will make this hold easier.

PROGRESSION: Placing the feet higher than the palm will make this hold harder.



PERFORMANCE: Kneel down and place both forearms on the floor, around shoulder-width apart. Step your legs back behind you, resting on your toes and forearms with the limbs locked and the body straight and aligned. Raise one locked leg up behind you; once stabilized, raise the opposite arm up and extend it out in front of you. Hold the position. Reverse the motion to complete the hold.

- "Gecko" drills are so-named because that lizard will hold up alternate legs to reduce surface area when in contact with hot ground.

REGRESSION: Resting your upper-body on one palm (push-up style) rather than the forearm will make this hold easier.

PROGRESSION: Placing the foot higher than the palm will make this hold harder.

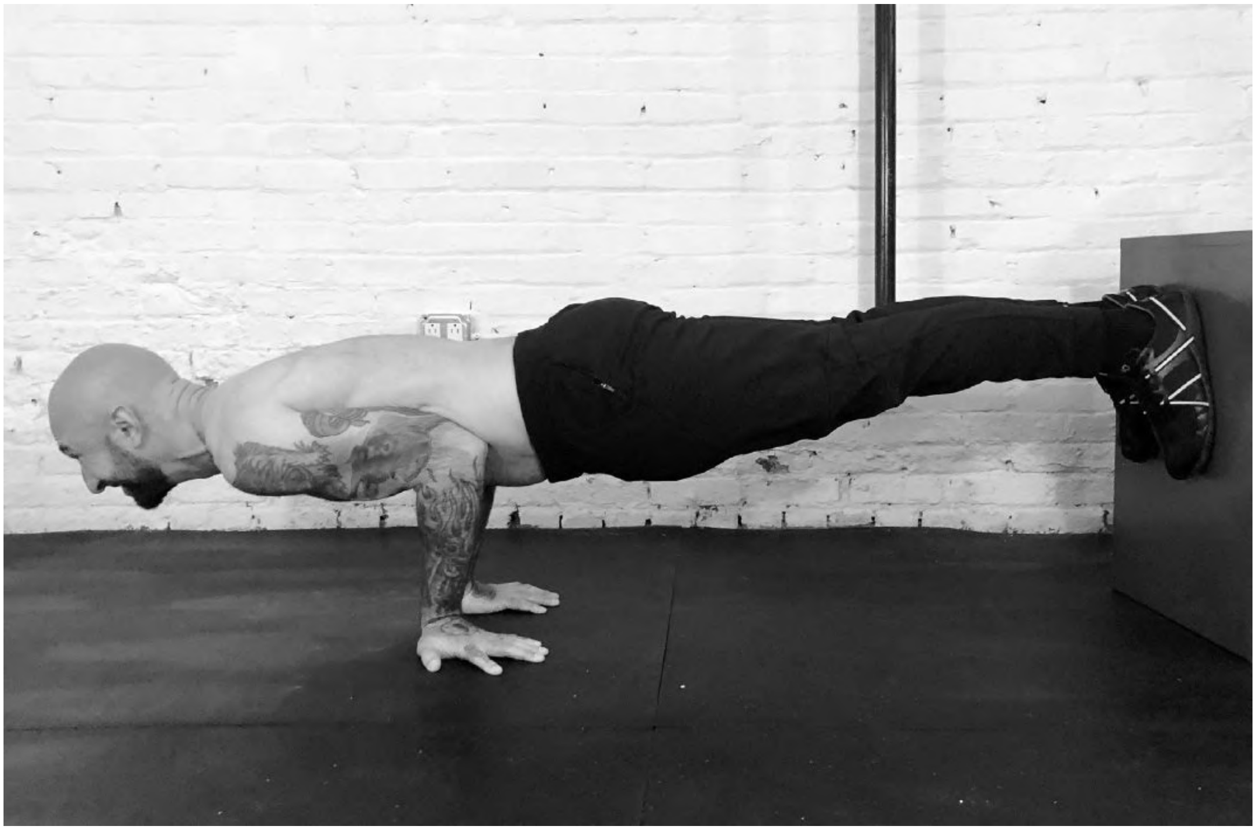
PERFORMANCE: Kneel down in front of a sturdy wall and place both forearms on the floor, around shoulder-width apart. One at a time, press your feet back into the wall, until the body is locked straight. Hold the position. Reverse the motion to complete the hold.

- *Wall planks* are a great intermediate hold to lead to the *elbow lever,* because—unlike for most planks—both the legs are up off the floor, forcing the body to generate extra tension to compensate. Once this hold is easier, you can "march", by alternately taking your feet from the wall.

REGRESSION: Placing one knee on the floor will make this hold easier.

PROGRESSION: Raising one arm, one leg (or both) will make this hold harder.

STEP 7: WALL ELBOW LEVER



PERFORMANCE: Kneel down in front of a sturdy wall and lodge your elbows into your obliques above the hips. Place your palms on the floor beneath your elbows, fingers pointing out or towards your feet. Find a position that suits you. One at a time, press your feet back into the wall, until the body is locked straight. Hold the position. Reverse the motion to complete the hold.

- *Wall elbow levers* are an excellent way to learn the correct elbow/arm/palm position for the *elbow lever*, before moving on to harder variations. When you first attempt this position, beware of tipping forward.

REGRESSION: Placing one knee on the floor will make this hold easier.

PROGRESSION: Removing one leg from the wall will make this hold harder.

ELBOW LEVER PROGRESSIONS STEP 8: RAISED ELBOW LEVER

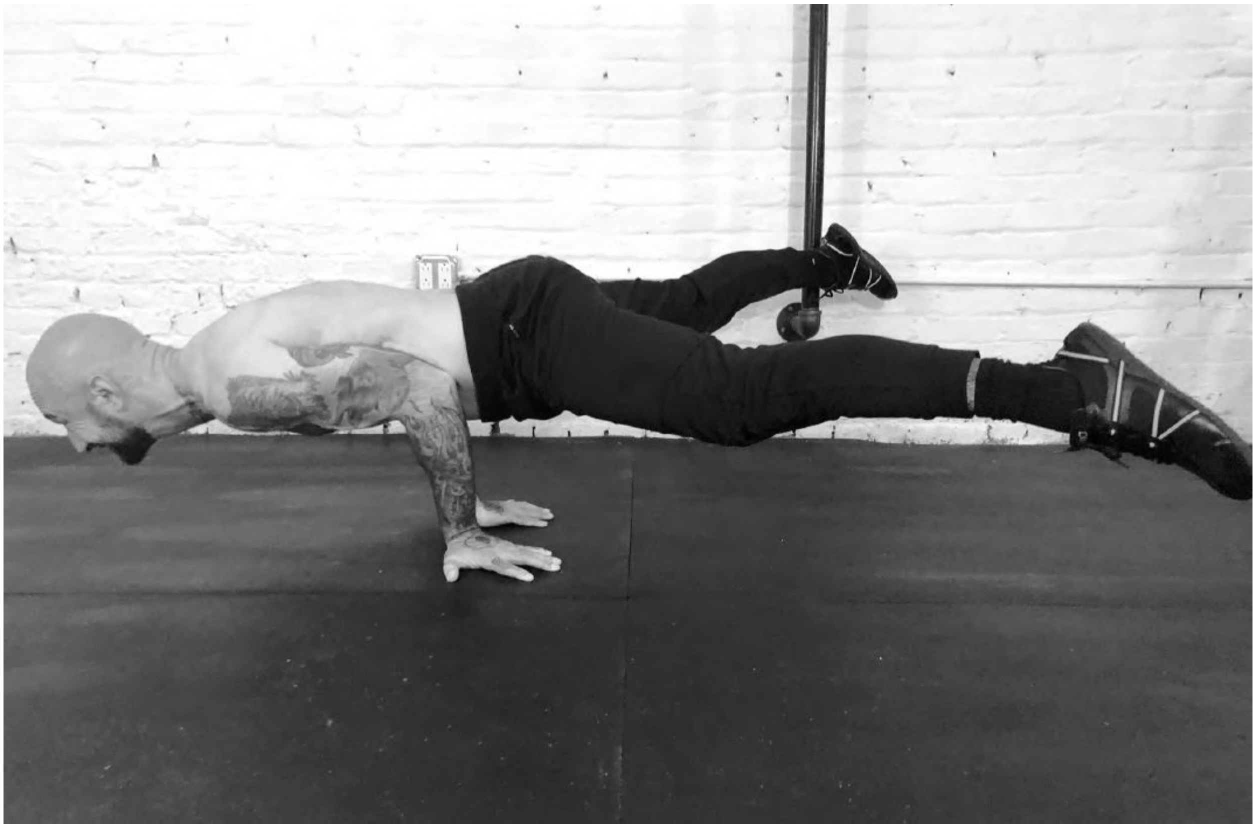
PERFORMANCE: Approach a sturdy table or desk. Place your palms on the edge of the surface, below your chest, fingers gripping the ridge. Lodge your elbows into your obliques above your hips, and gradually lean forward, using your elbows as a pivot point. Continue until your feet are off the ground. Hold the position. Reverse the motion to complete the hold.

- *Raised elbow levers* require as much upper-body strength as full *elbow levers*, however the balance factor is reduced due to the lower center of gravity (because the feet are lower than the hands).

REGRESSION: Using a lower horizontal base will make this technique easier.

PROGRESSION: Straightening the body will make this technique harder.

STEP 9: SPLIT ELBOW LEVER



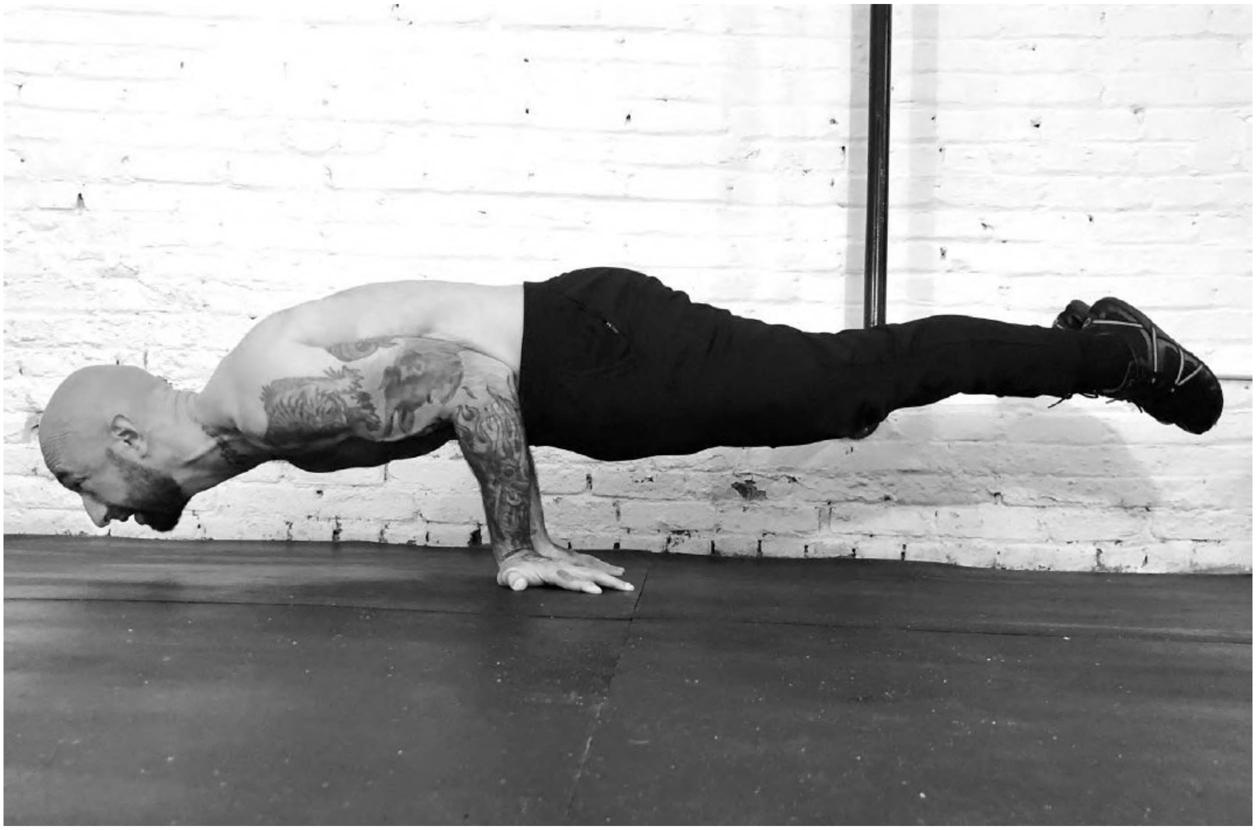
PERFORMANCE: Kneel down on the ground and lodge your elbows into your obliques above the hips. Place your palms on the floor beneath your elbows, fingers pointing out or towards your feet. Keeping your legs straight, spread your feet as far apart as is comfortable and gradually lean forward, using your elbows as a pivot point. Continue until your feet are off the ground. Hold the position. Reverse the motion to complete the hold.

- *Split elbow levers* require less posterior chain strength than full *elbow levers* because their load is decreased due to reduced leverage.

REGRESSION: Bending the knees will make this hold easier.

PROGRESSION: Bringing the legs slightly together will make this hold harder.

MASTER STEP: ELBOW LEVER

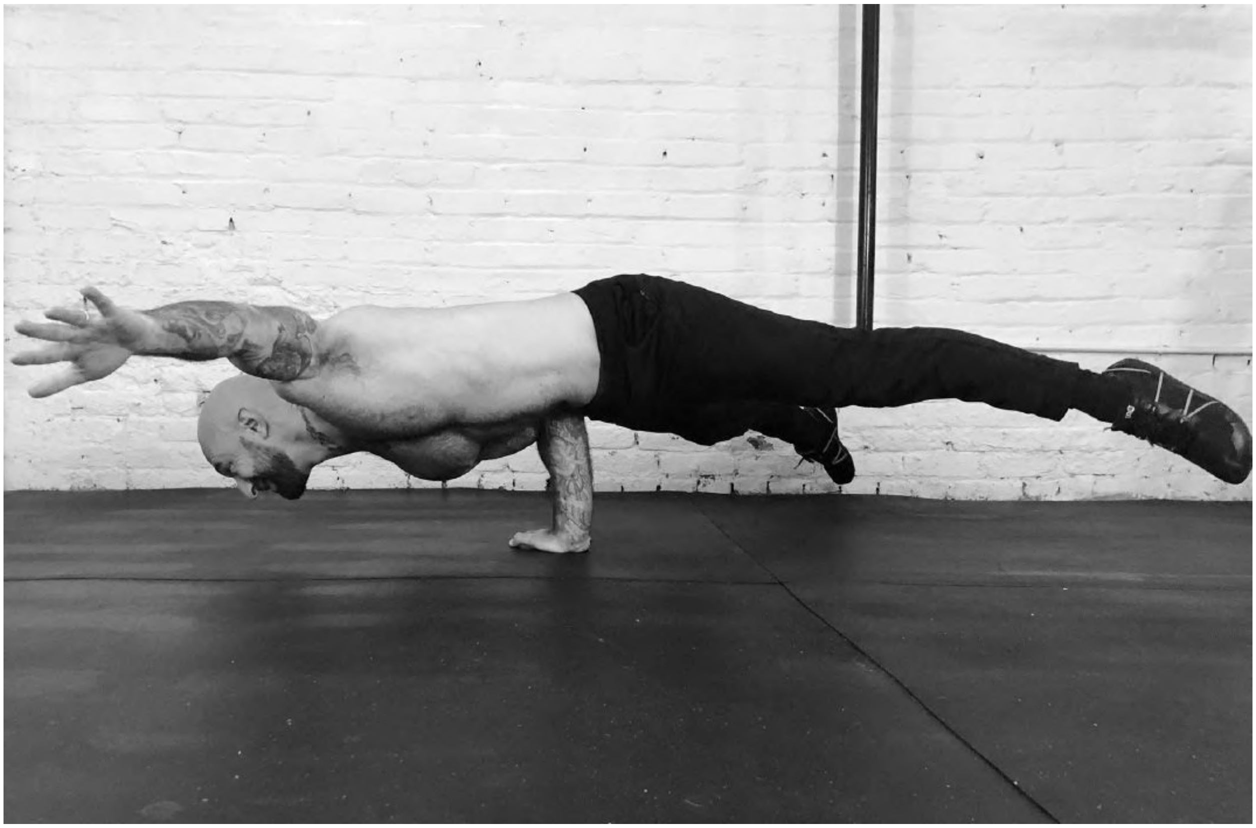


PERFORMANCE: Kneel down on the ground and lodge your elbows into your obliques above the hips. Place your palms on the floor beneath your elbows, fingers pointing out or towards your feet. Keeping your legs straight, gradually lean forward, using your elbows as a pivot point. Continue until your feet are off the ground. Hold the position. Reverse the motion to complete the hold.

- *Elbow levers* are quickly attainable by anyone following these progressions, however they provide training benefits which transfer heavily to more advanced holds (such as hanging levers and handstands): the ability to generate tension, maintain a perfectly aligned body, and to keep balanced.

REGRESSION: Performing the hold on a raised base will make it easier.

GOING BEYOND



The skills you will learn in the elbow lever—balance, alignment, total-body tension and hand/shoulder strength—carry over to the more advanced holds such as hanging levers and handstands. For this reason, most athletes who master the elbow lever should become more advanced by pouring their energies into these harder bodyweight holds. That said, if you love the elbow lever and want to specialize, the *one-arm elbow lever* is the perfect option (demonstrated above by the awesome Al Kavadlo). You can use one-arm variations of steps 7-9 to get there.

20: HANDSTANDS:

Gymnast-Like Shoulders and Balance

HANDSTAND
THE TEN STEPS

1. ***Wall headstand***
2. ***Free headstand***
3. ***Tripod headstand***
4. ***Incline handstand***
5. ***Crow stand***
6. ***Wall jackknife handstand***
7. ***Wall handstand***
8. ***Reverse wall handstand***
9. ***Kick-aways***
10. ***MASTER STEP: Free handstand***

The handstand is not only a beautiful hold, it's also an exemplary demonstration of shoulder strength, coordination, and expert balance. We begin the journey to this iconic feat by getting used to being upside-down, via headstands (steps 1-2). From there, we bring the palms and arms into our training (step 3). When this becomes easy, we strengthen the hands, wrists and shoulders to take more bodyweight (step 4), and then finally hold the entire body in a basic hand balance (step 5). From there, we gradually learn handstands, first against the wall (steps 6-9) and ultimately free standing.

STEP 1: WALL HEADSTAND

PERFORMANCE: Kneel down in front of a sturdy wall and place your head on a slim cushion. Secure your hands behind your head, and rest your weight on your forearms. Straighten your strongest leg and keep your opposite leg bent *(inset)*. Kick up with your straight leg, as you press down with the bent leg, propelling your lower body upwards. When your body is inverse and aligned against the wall, hold the position. Smoothly lower your legs to complete the hold.

- Beginning handstand progressions with headstands forces athletes to adapt to the inverse position; they also teach the basic kick-up technique.

REGRESSION: Getting assistance from a partner will make this hold easier.

PROGRESSION: Placing the palms on the floor will make this hold harder.

PERFORMANCE: Ensure your training area is clear. Kneel down and place your head on a slim cushion. Secure your hands behind your head, and rest your weight on your forearms. Straighten your strongest leg and keep your opposite leg bent. Kick up with your straight leg, as you press down with the bent leg, propelling your lower body upwards. When your body is inverse and aligned, hold the position. Smoothly lower your legs to complete the hold.

- *Free headstands* begin teaching athletes how to hold the body balanced when inverse; this is also the idea time to learn how to bail out by rolling.

REGRESSION: Getting assistance from a partner will make this hold easier.

PROGRESSION: Raising and lowering with straight legs will make this hold harder.

STEP 3: TRIPOD HEADSTAND

PERFORMANCE: Ensure your training area is clear. Kneel down and place your head on a slim cushion. Place your palms on the floor, slightly wider than shoulder-width, in front of your head. Draw the knees in towards the trunk (*inset*). Once you have equilibrium, extend your legs straight up. When your body is inverse and aligned, hold the position. Smoothly lower your legs to complete the hold.

- *Tripod headstands* move on from *free headstands* by teaching the athlete how to support some of their inverse weight through the palms.

REGRESSION: Getting assistance from a partner will make this hold easier.

PROGRESSION: Raising and lowering with straight legs will make this hold harder.

PERFORMANCE: Find a secure base around thigh-height (the arm of a couch can work well). Kneel in front of the object and place your palms on the ground, at about shoulder-width beneath you. Now alternately place both legs up on the base, and align your legs and trunk, keeping the arms locked out straight. When your body is approximately diagonal and aligned, hold the position. Replace your legs on the ground to complete the hold.

- Once an athlete has mastered the *tripod headstand,* this step assures that they have the hand, wrist, arm and shoulder strength for later steps.

REGRESSION: Placing the feet on a lower base will make this hold easier.

PROGRESSION: Placing the feet on a higher base will make this hold harder.

PERFORMANCE: Squat down, and place your palms on the floor beneath your chest. Approximately shoulder-width is correct for most people. Tip forward, and place your knees on the outside of your elbows. Your arms should be slightly bent. Continue leaning forward until your feet leave the ground. Hold the position. Replace your legs on the ground to complete the hold.

- The low center of gravity in the *crow stand* allows athletes to balance their body more easily than in regular handstands. The athlete also holds the entire bodyweight on the hands and wrists, strengthening them.

REGRESSION: Placing the forehead on a base or step will make this hold easier.

PROGRESSION: Completely straightening the arms will make this hold harder.

PERFORMANCE: Kneel down facing away from a sturdy wall. Place your palms on the floor about shoulder-width apart, and press one foot high

up into the wall. Place your second foot alongside the first, and when you are stable, “walk” your hands backwards until your trunk and arms are vertical, with legs and arms locked straight. Your body should form a right-angle, or “jackknife” posture. Hold the position. Reverse the movement to complete the hold.

- This step continues the progression of inverse movements begun with headstands, but begins to add serious strength to the shoulders and arms.

REGRESSION: Placing your feet lower will make this hold easier.

PROGRESSION: Placing your feet higher will make this hold harder.

STEP 7: WALL HANDSTAND

PERFORMANCE: Place your palms down, shoulder-width apart and about one hand length in front of a sturdy wall. Straighten your strongest leg and keep your opposite leg bent *(inset)*. Kick up with your straight leg, as you press down with the bent leg, propelling your lower body upwards. Keep your arms locked straight throughout. When your body is inverse and aligned against the wall, hold the position. Smoothly lower your legs to complete the hold.

- The kick-up technique you learned with headstands is very similar for basic handstands.

REGRESSION: Resting more of the body against the wall will make this hold easier.

PROGRESSION: Resting just the heels against the wall will make this hold harder.

PERFORMANCE: Kneel down facing away from a sturdy wall. Place your palms on the floor about shoulder-width apart, and press one foot high up into the wall, as you did for step 6. Place your second foot alongside the first, and when you are stable, "walk" your feet upwards and your hands backwards until your entire body is close to the wall and vertical, with legs and arms locked straight. Hold the position. Reverse the movement to complete the hold.

- *Reverse wall handstands* are slightly harder than regular *wall handstands*; facing the wall so closely forces good body mechanics and alignment.

REGRESSION: Resting your knees against the wall will make this hold easier.

PROGRESSION: Resting the toes *lightly* against the wall will make this hold harder.

PERFORMANCE: Walk up to a *reverse wall handstand* (step 8). Once you are well-balanced, with only your toes in contact with the wall, remove one foot. If you can re-establish balance, then remove the second foot. At first, you will only be able to hold the "free" position for a split-second before touching the wall again. Build up your time with practice. This is how the true *free handstand* is built.

- Make sure you understand how to roll out safely before trying this step.

REGRESSION: Performing *kick-aways* while in a regular *wall handstand* (facing away from the wall) will make this step easier.

PROGRESSION: As this step gets easier, try to spend longer periods in handstand with both feet away from the wall—use it for *safety*, rather than support.

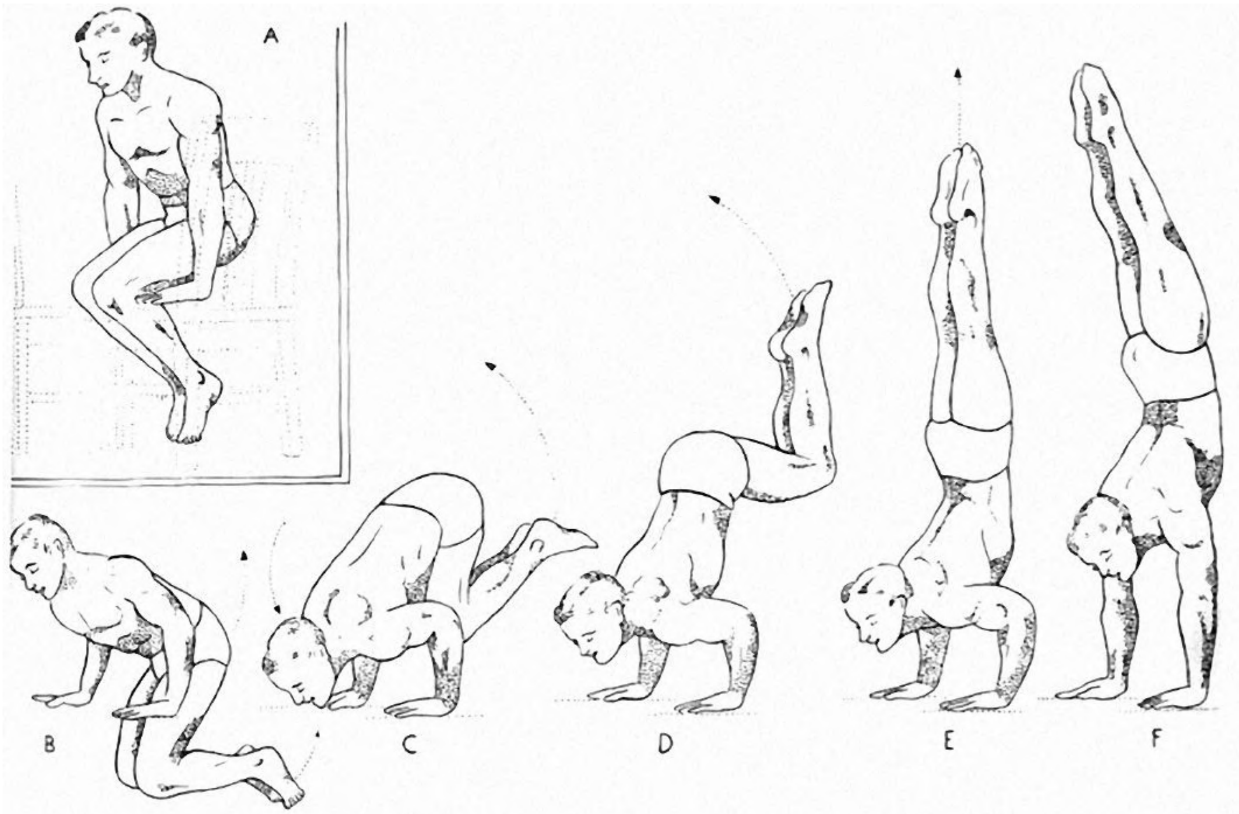
PERFORMANCE: Place your palms down, approximately shoulder-width apart. Straighten your strongest leg and keep your opposite leg bent.

Kick up with your straight leg, as you press down with the bent leg, propelling your lower body upwards. Find your equilibrium when upside-down by "stepping" with the hands, keeping your arms straight throughout. When your body is inverse and as aligned as possible, hold the position. Smoothly lower your legs to complete the hold.

- The *free handstand* not only requires great strength in the shoulders and arms; it also requires huge balance and control, especially if you keep a perfectly straight, aligned body. A truly iconic feat of bodyweight strength!

REGRESSION: Learning this step with a partner spotting you (catching your feet when you kick your legs upright) will make this hold easier.

GOING BEYOND



An excerpt from the classic York Handbalancing Course

The beautiful thing about achieving the handstand—at least, in my opinion—is that your journey is really only just beginning. Once comfortable on your hands for around thirty seconds, you can explore walking on your hands. Some powerhouses can "walk" up stairs this way—imagine the shoulder and arm power required! You can also "jump" on your hands, even clapping whilst in mid-air. To build extra strength and control, work on transitioning into handstand from different positions: from a bridge; on parallel bars; from an L-hold; from a bridge to handstand to L-hold, and so on.

21: L-HOLDS:
Gymnast-Like Shoulders and Balance

L-HOLD
THE TEN STEPS

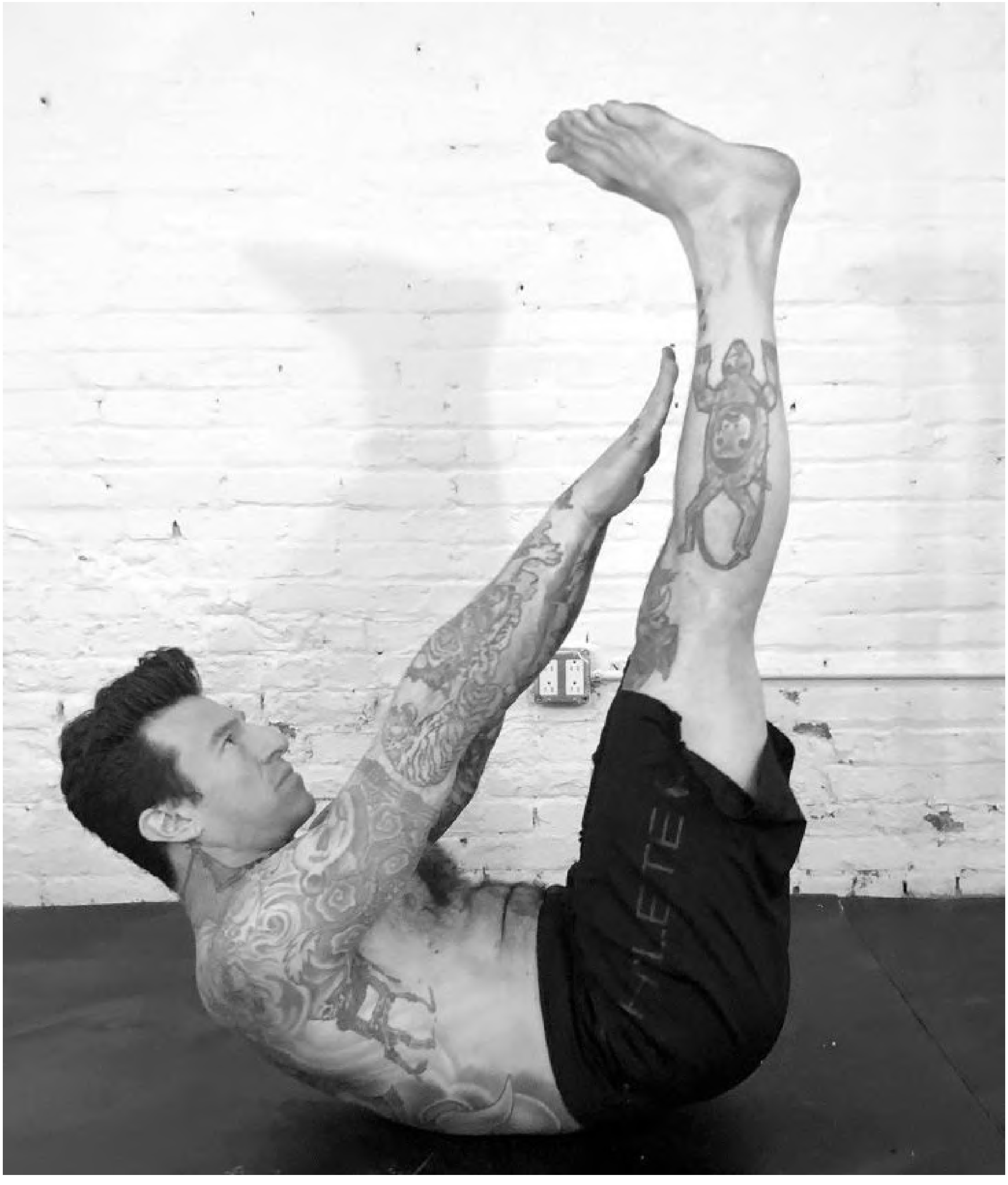
1. *Lying jackknife hold*
2. *Jackknife hold*

3. ***Bent-leg hold***
4. ***Raised tuck hold***
5. ***Raised N-hold***
6. ***N-hold***
7. ***Uneven N-hold***
8. ***Raised L-hold***
9. ***Bent L-hold***
10. ***MASTER STEP: L-hold***

The L-hold is the archetypal midsection hold, building powerful hips and abdominals. Mastery of this hold will be of huge help to athletes attempting harder hanging levers, which all require very strong midsections. We begin with floor exercises, to strengthen and condition the abdominal muscles (steps 1-2). Then we learn to hold our bent-legs up with the thighs horizontal (step 3). The raised tuck hold (step 4) transitions us into a series of three progressive N-holds, where the knees are still bent (steps 5-7), before moving through three progressively harder versions of the L-hold (steps 8-10).

L-HOLD PROGRESSIONS

STEP 1: LYING JACKNIFE HOLD

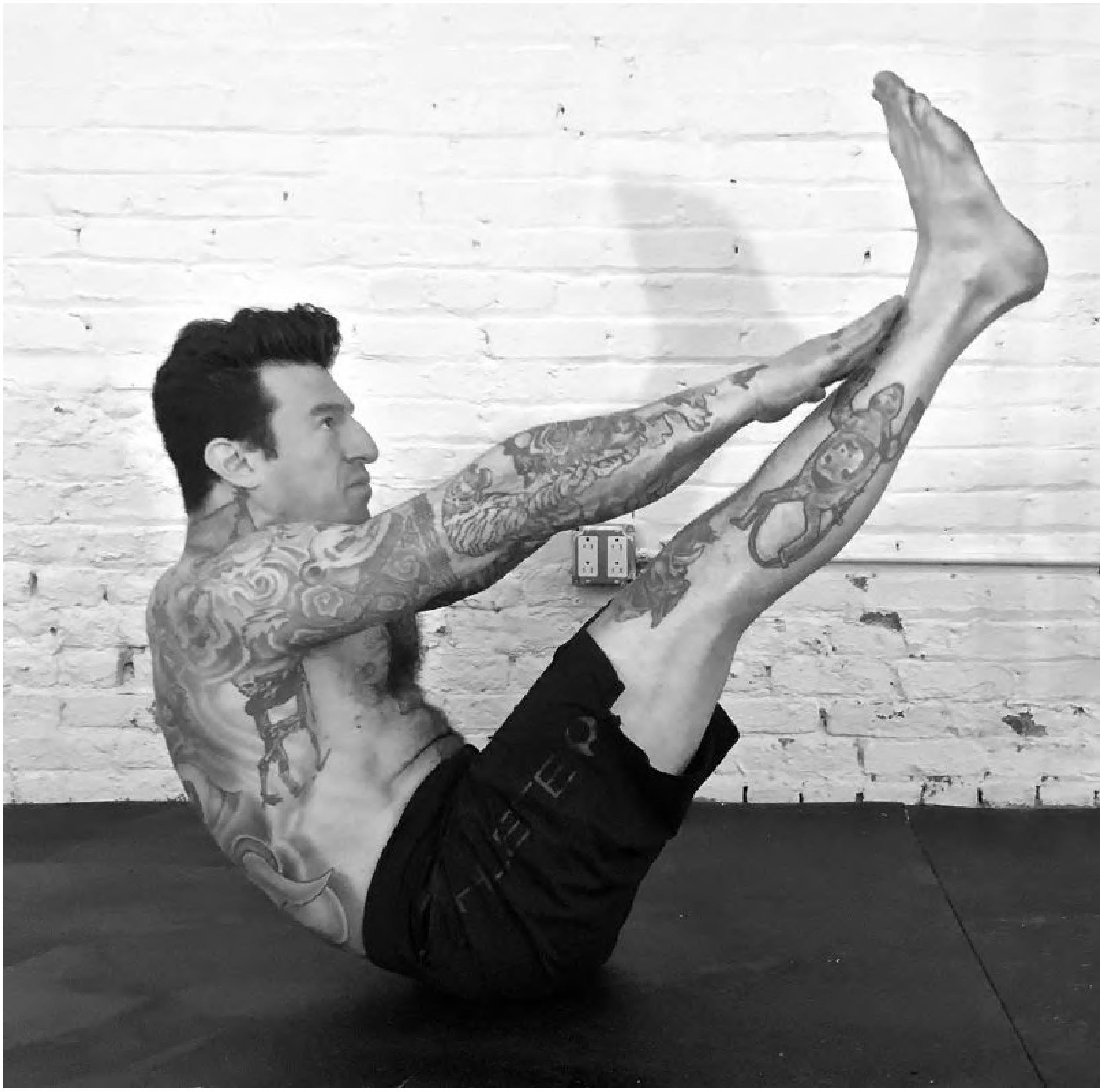


PERFORMANCE: Lay supine on the floor. Keeping the legs reasonably straight and close together, raise them upwards. Simultaneously lift your hands towards your feet, while lifting the shoulders off the ground. When the legs are vertical and the fingers touch the shins, hold the position. Reverse the motion to complete the technique.

- Don't yank into position; moving smoothly and under control will build superior abdominal strength, while protecting the spine.

REGRESSION: Bending the legs will make this hold easier.

PROGRESSION: Touching the fingers to the toes in the top position will make this hold harder.

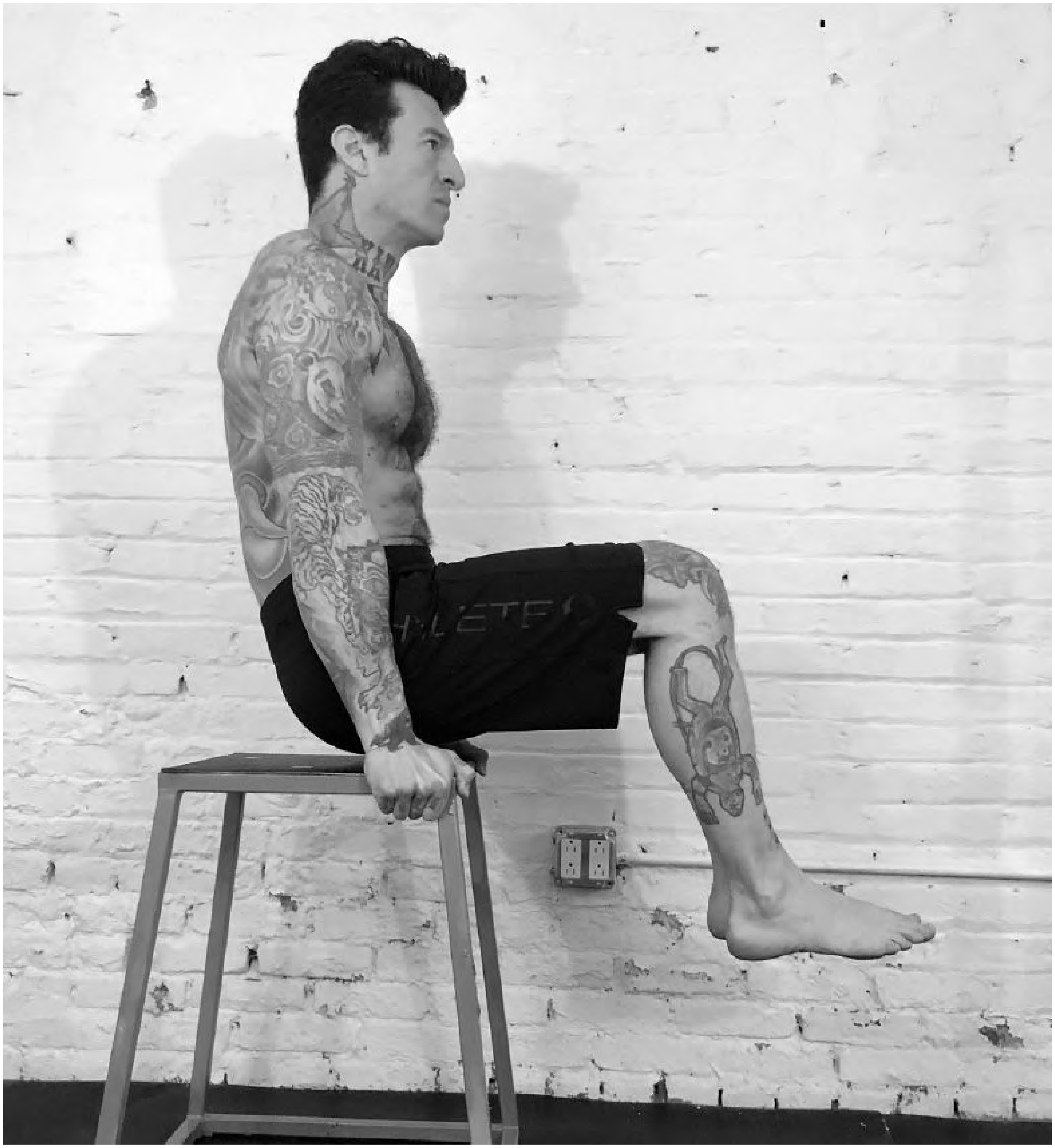


PERFORMANCE: Lay supine on the floor. Keeping the legs reasonably straight and close together, raise them upwards. Simultaneously lift your hands towards your feet, while lifting the shoulders and trunk off the ground. When the legs are nearly vertical and the fingers touch the shins, only the gluteal muscles should be in contact with the ground. Hold the position. Reverse the motion to complete the technique.

- Move smoothly and under full control in all midsection holds.

REGRESSION: Bending the legs will make this hold easier.

PROGRESSION: Touching the fingers to the toes in the top position will make this hold harder.



PERFORMANCE: Find parallel bars to grip at about shoulder-width. (Many chairs will work great for this). Lock your arms, and smoothly raise

your knees up until your thighs are horizontal. Hold the position. Reverse the motion to complete the technique.

- On all midsection holds, keep the legs pressed closely together to work the adductors of the inner thigh.

REGRESSION: Keeping the hips below the palms (for example, when using the arms of a chair) will make this hold easier.

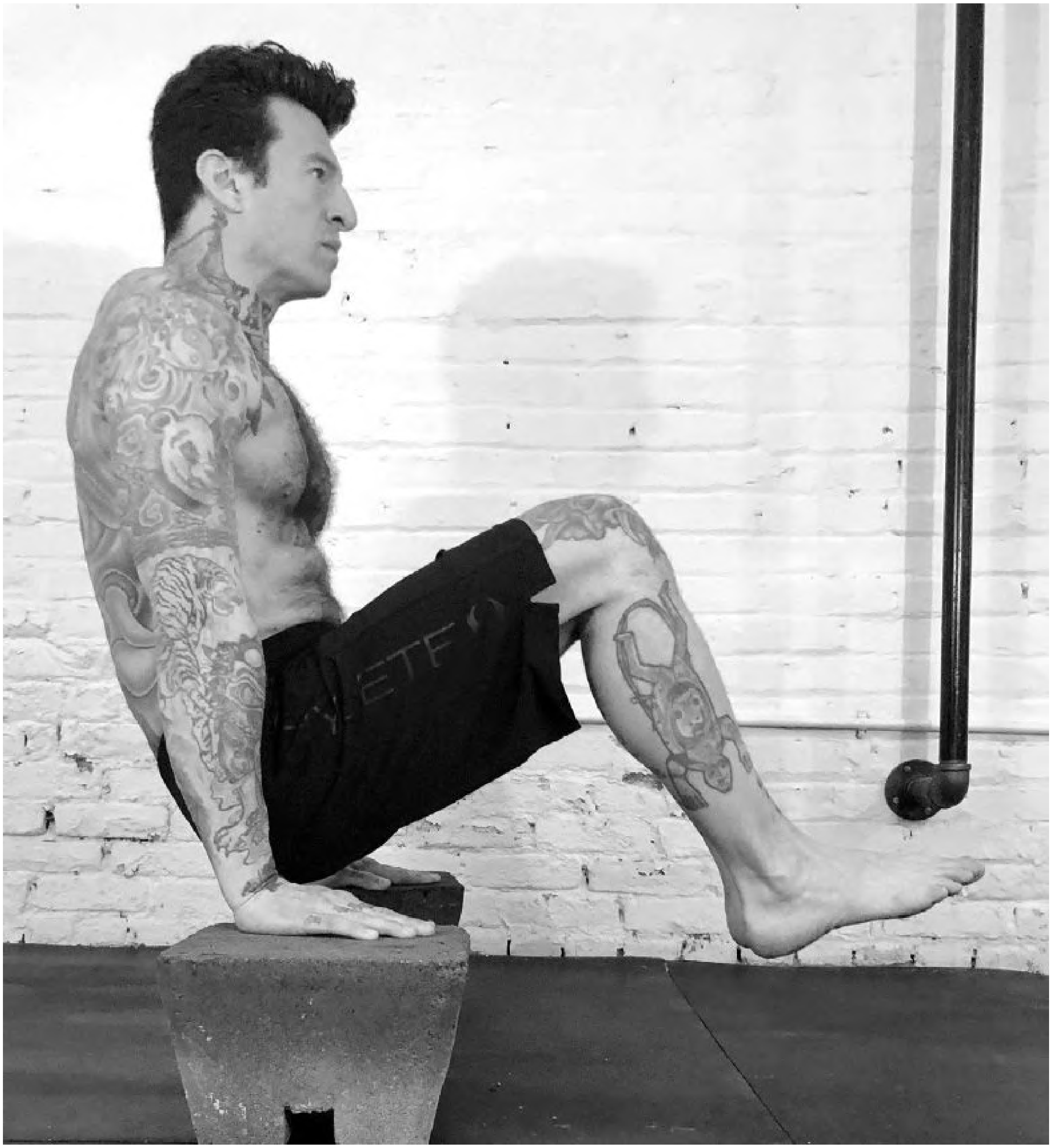
PROGRESSION: Bringing the knees high into the chest or beginning to straighten the legs will make this hold harder.

PERFORMANCE: Squat down between two parallettes or raised blocks (e.g., stacks of books, cinderblocks, bricks, etc.) around six to ten inches off the ground. Your feet should be directly under you. Grip or place your hands on the raised bases, lock your arms, and smoothly raise your knees up until your toes are off the ground. Hold the position. Reverse the motion to complete the technique.

- The *raised tuck hold* is easier than the *raised N-hold* (step 5) because your feet are beneath you. In the *raised N-hold* your feet are out in front, which requires higher knees and greater abdominal contraction.

REGRESSION: Using higher pressing bases will make this hold easier.

PROGRESSION: Using lower pressing bases will make this hold harder.



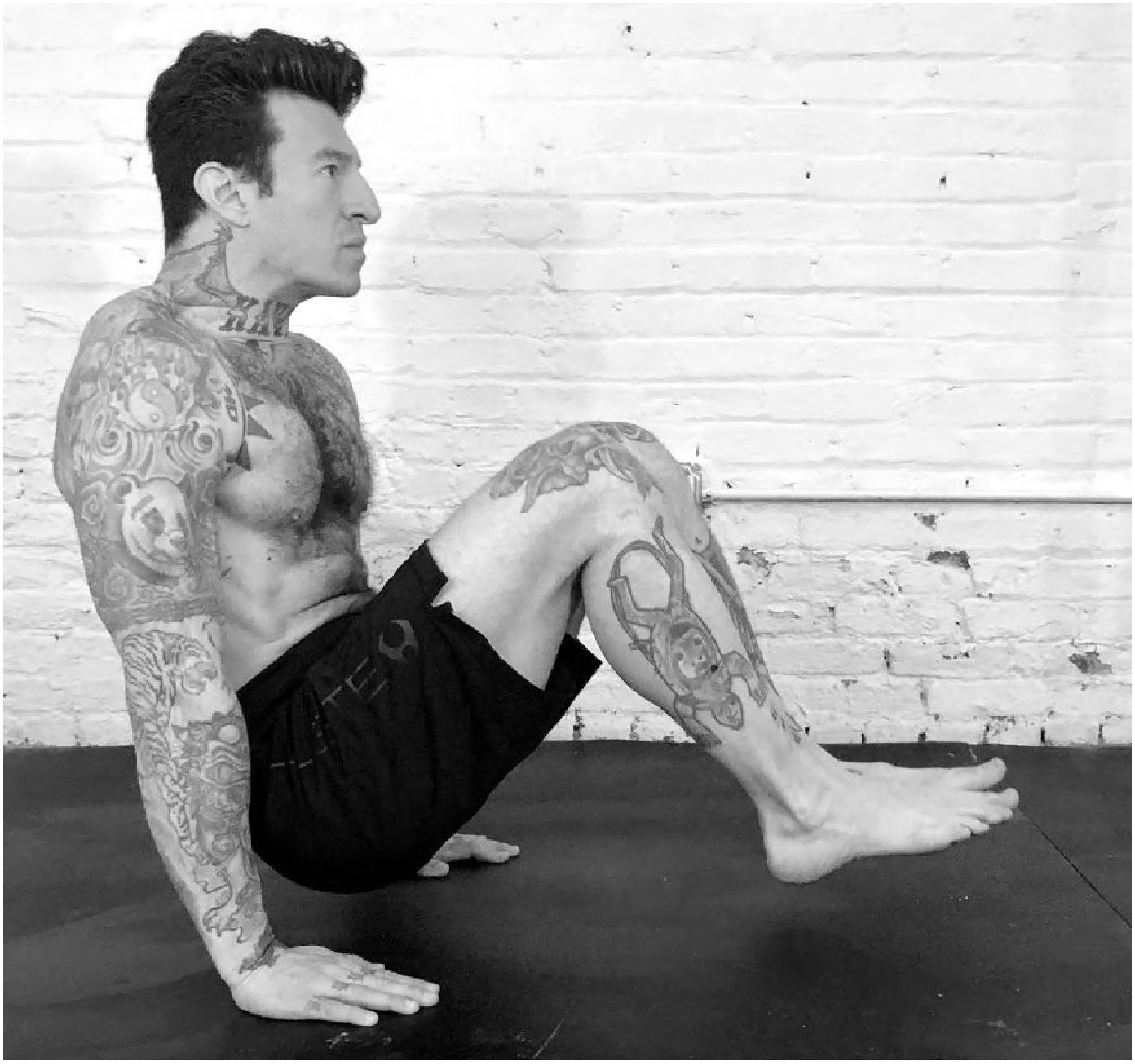
PERFORMANCE: Sit down on a surface raised no more than knee-height from the ground (a step or even a sturdy coffee table will work well). Keep the knees bent at about 90 degrees. Place your palms on the surface

either side of you, lock your arms, and smoothly raise yourself up until your hips are clear of the surface and your feet are off the ground, in front of you. Hold the position. Reverse the motion to complete the technique.

- This step is harder than the similar *bent-leg hold* (step 3) because the lower height of the pressing base requires the thighs to be higher than horizontal.

REGRESSION: Using higher pressing bases will make this hold easier.

PROGRESSION: Using lower pressing bases will make this hold harder.



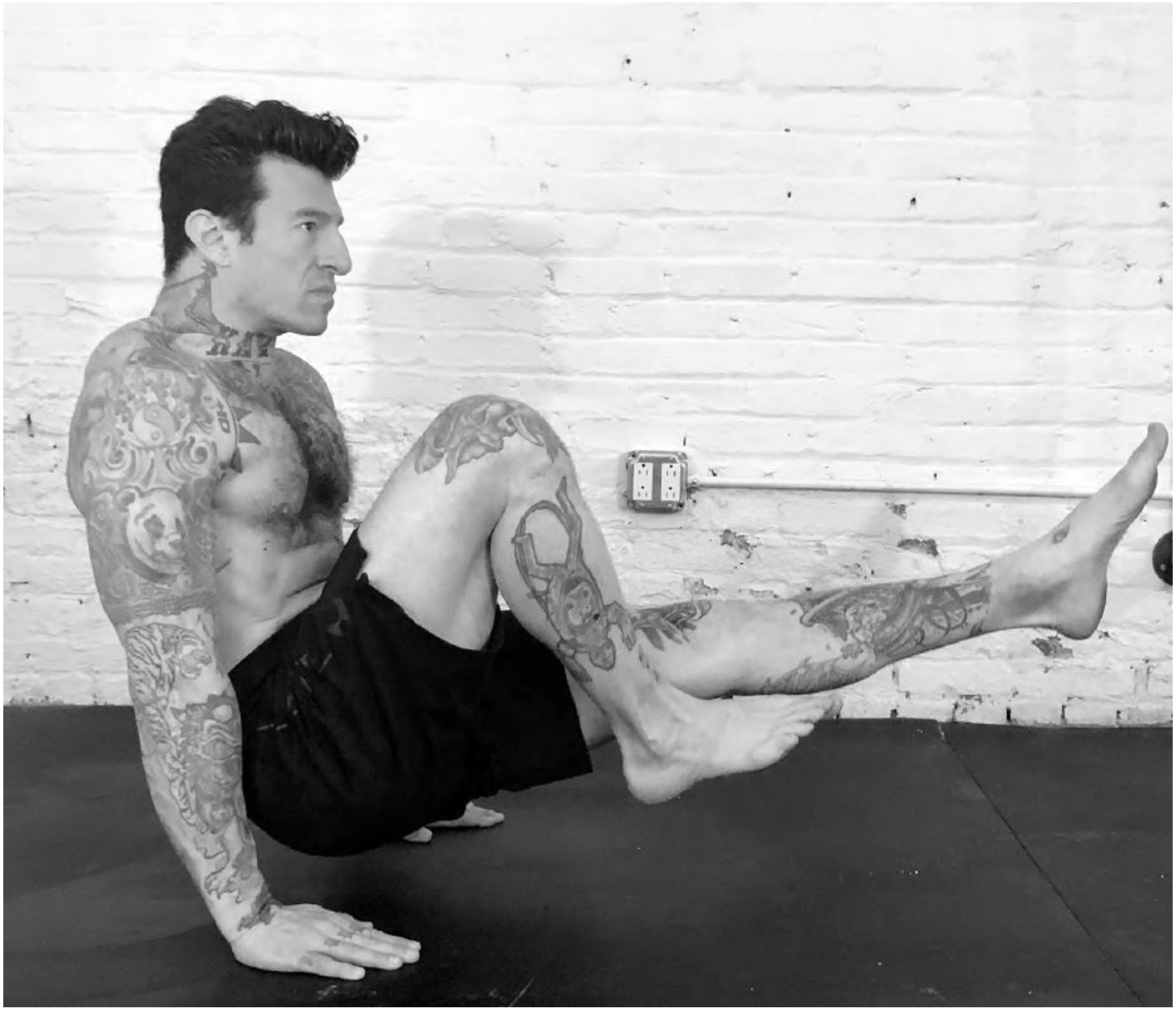
PERFORMANCE: Sit down on the ground, with your knees bent in front of you at about 90 degrees. Place your palms on the floor either side of you, lock your arms, and smoothly raise yourself up until your hips are clear of the surface and your feet are off the ground in front of you. Hold the position. Reverse the motion to complete the technique.

- During *raised N-holds* (step 5), the raised pressing base allows you to lift your feet from the floor at a level lower than your hands.

Performing the same exercise on the floor means you need to lift the feet above the hands.

REGRESSION: Pressing off the knuckles will make this hold easier.

PROGRESSION: Extending the legs will make this hold harder.

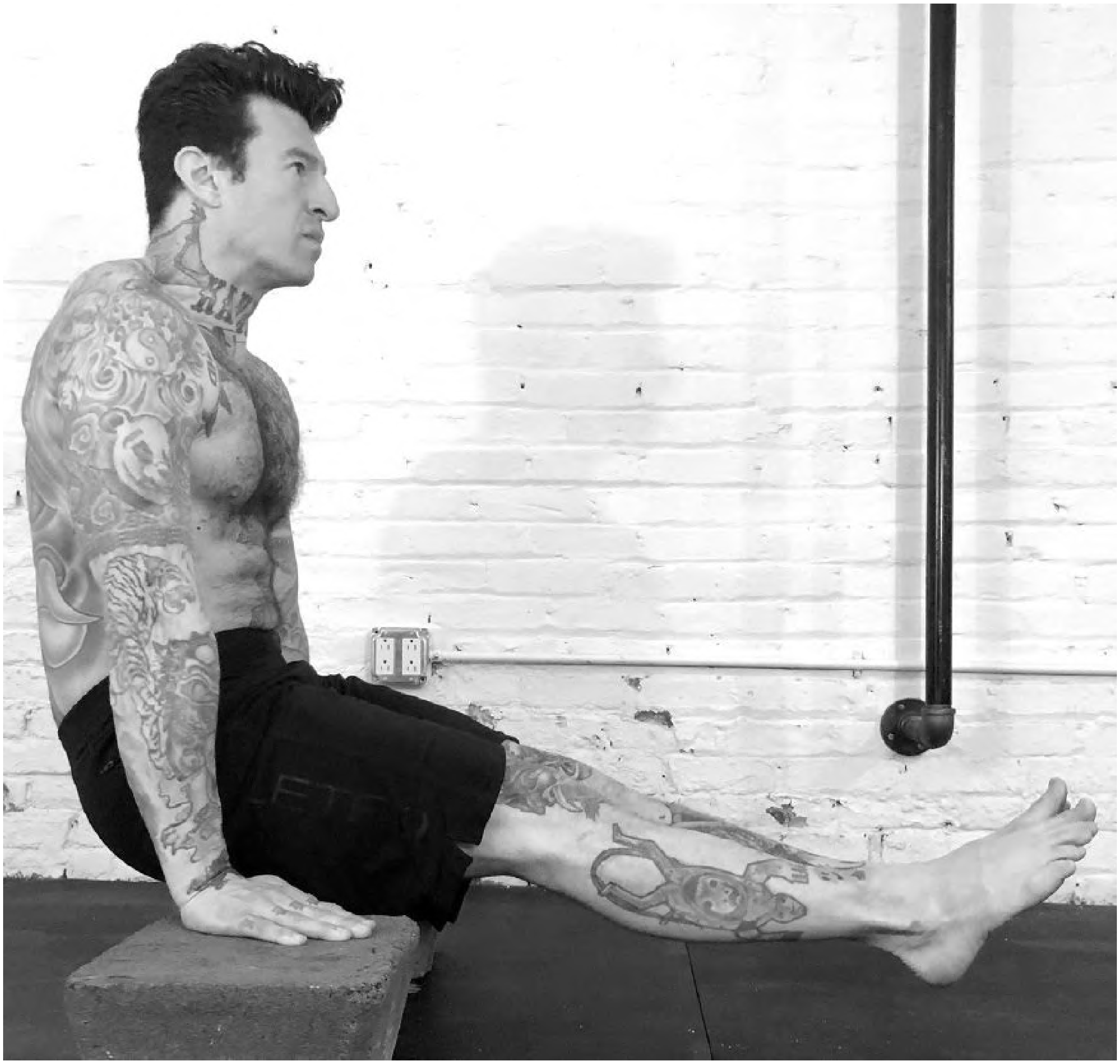


PERFORMANCE: Sit down on the ground, with one knee bent in front of you at about 90 degrees, and the other leg straight. Place your palms on the floor either side of you, lock your arms, and smoothly raise yourself up until your hips are clear of the surface and your feet are off the ground in front of you. Hold the position. Reverse the motion to complete the technique.

- You can either switch legs for the next hold, or alternate legs during the hold by pulling one knee up whilst extending the other, then repeating. This technique works for all asymmetrical one-leg holds.

REGRESSION: Pressing off the knuckles will make this hold easier.

PROGRESSION: Extending the legs will make this hold harder.



PERFORMANCE: Sit down on a surface raised no more than knee-height from the ground (a sturdy coffee table or a step will work well). Lock your legs straight out in front of you. Place your palms on the surface either side of you, lock your arms, and smoothly raise yourself up until your hips are clear of the surface and your feet are off the ground, in front of you. Hold the position. Reverse the motion to complete the technique.

- This step allows athletes to learn the locked leg element of the *L-hold,* but the heels being lower than the hands makes the hold less demanding.

REGRESSION: Using higher pressing bases will make this hold easier.

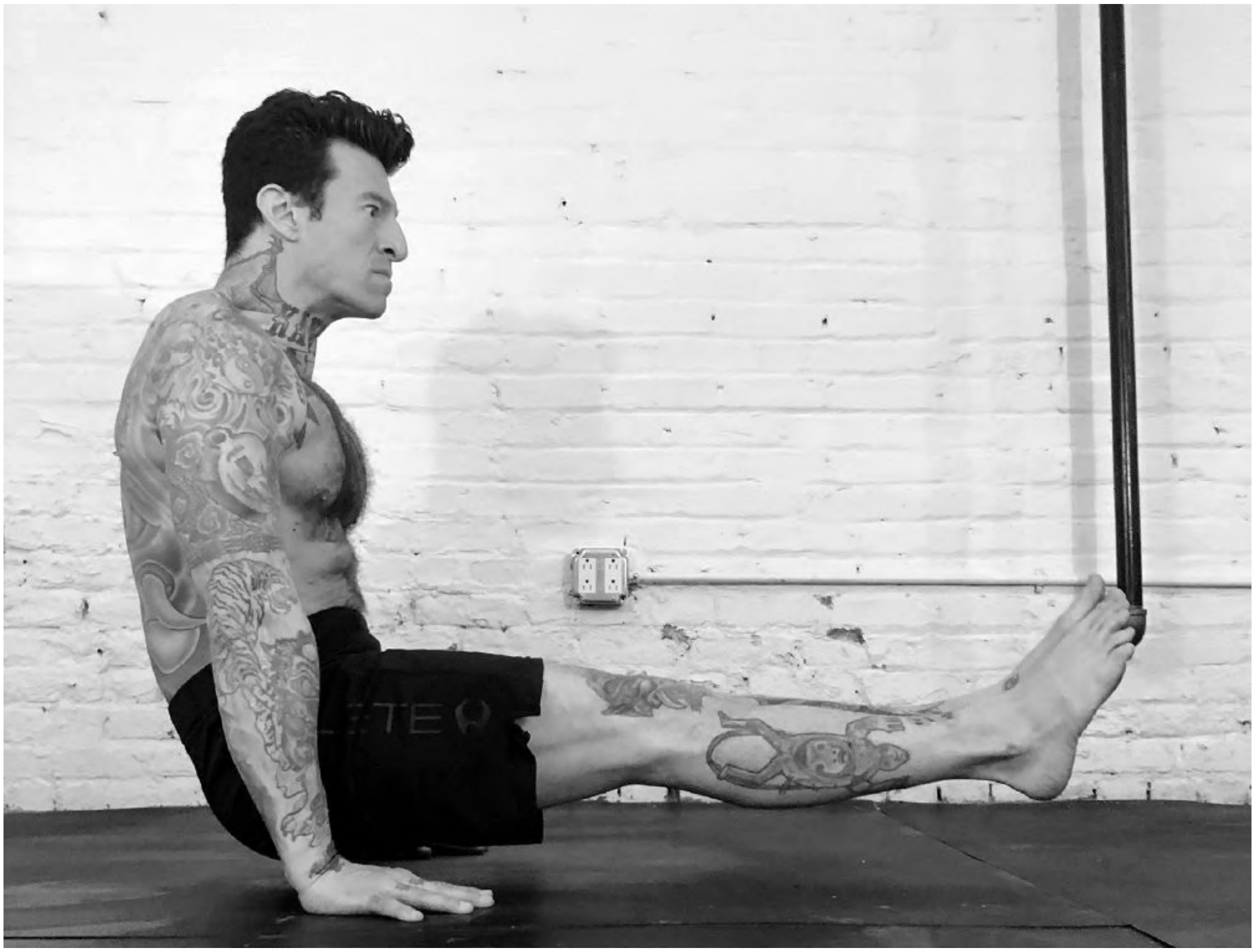
PROGRESSION: Using lower pressing bases will make this hold harder.

PERFORMANCE: Sit down on the ground, with the legs out in front of you, slightly bent at the knees. Place your palms on the floor either side of you, lock your arms, and smoothly raise yourself up until your hips are clear of the floor and your feet and legs are off the ground, in front of you. Keeping a bend in your knees, hold the position. Reverse the motion to complete the technique.

- This step is essentially the *L-hold*, but the slight bend at the knees makes it more achievable. In all the later steps, do your best to keep your back reasonably straight and upright.

REGRESSION: Pressing off the knuckles will make this hold easier.

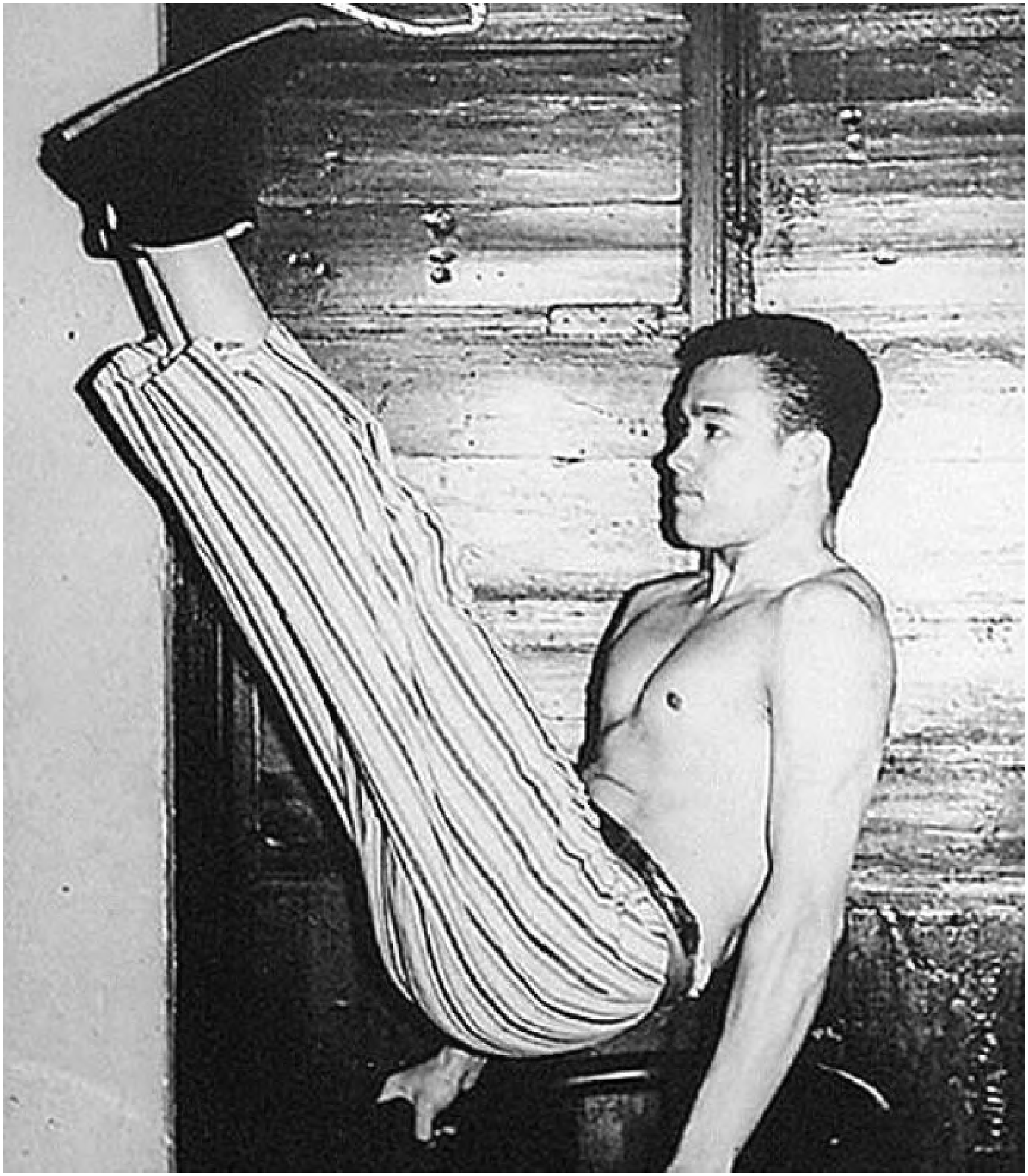
PROGRESSION: Extending the legs will make this hold harder.



PERFORMANCE: Sit down on the ground, with the legs locked out in front of you, slightly bent at the knees. Place your palms on the floor either side of you, lock your arms, and smoothly raise yourself up until your hips are clear of the floor and your feet and legs are off the ground, in front of you. Your trunk and legs should form a perfect right-angle, like the letter "L" (hence the name). Hold the position. Reverse the motion to complete the technique.

- The *L-hold* is performed by gymnasts and martial artists alike for its ability to build steel-whip hip power and deep strength in the waist. Many seemingly-strong bodybuilders who can squat and deadlift huge amounts have attempted this deceptively simple hold, only to be totally humbled!

REGRESSION: Pressing off the knuckles will make this hold easier.



A young Bruce Lee trains his famous abdominals with the V-sit

Once you adapt to the *L-hold*, it is actually surprisingly easy. It's versatile, also; you can use it while doing pullups, or even as a transition into a handstand. For most athletes, mastery of the *L-hold* will give them all the midsection strength they desire, but those heroes who want to take things further can explore the *V-hold*. Just as it sounds, the *V-hold* involves holding the legs (and hips) up at a much greater angle than for the *L-hold*, requiring exponentially more flexibility and power, particularly in the muscles of the trunk. Truly talented athletes can bring their legs right up to vertical, but these folks are few and far between. The beautiful and powerful Grace Kavadlo demonstrates perfect form, on the following page.

22: BACK LEVERS:
Elite Spinal Strength

Bodyweight master Al Kavadlo instructs athletes in the finer points of the back lever in the world-famous PCC workshops.

BACK LEVER
THE TEN STEPS

1. ***Hang-under***

2. ***German hang***
3. ***Inverse pike***
4. ***Inverse back hang***
5. ***Diagonal back lever***
6. ***Closed tuck back lever***
7. ***Open tuck back lever***
8. ***One-leg back lever***
9. ***Split back lever***
10. ***MASTER STEP: Back lever***

The L-hold is the archetypal midsection hold, building powerful hips and abdominals. Mastery of this hold will be of huge help to athletes attempting harder hanging levers, which all require very strong midsections. We begin with floor exercises, to strengthen and condition the abdominal muscles (steps 1-2). Then we learn to hold our bent-legs up with the thighs horizontal (step 3). The raised tuck hold (step 4) transitions us into a series of three progressive N-holds, where the knees are still bent (steps 5-7), before moving through three progressively harder versions of the L-hold (steps 8-10).

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the rest of the body braced. Jump up, bringing your knees high and passing your feet under the bar. Hold the position. Reverse the movement smoothly and under as much control as possible.

- Your grip needs to be strong to keep you safe while in this hold. If you cannot perform at least five pullups already, postpone this drill.

REGRESSION: If you cannot get your feet under the bar, perform the hold with your feet in front of the bar until you can.

PROGRESSION: To make the *hang-under* gradually harder, begin moving the feet even further behind the bar.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; continue the movement until your feet are below you and your body is nearly straight. Your shoulders will be in strong rotation. Hold the position. Release the bar and drop down safely.

- If you are strong enough you can reverse the movement to rotate yourself back up and under the bar. This is known as *skinning-the-*

cat.

REGRESSION: If you can't perform the full *German hang,* just work on the *hang-under,* allowing your feet to move a little further behind the bar when you can.

PROGRESSION: Brace the body and straighten at the waist.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; continue the movement until your feet are behind you with your glutes pointing towards the ceiling. Your body will be quite compressed at this point. Lock your legs, and hold the position. Reverse the movement smoothly and under as much control as possible.

- Instead of reversing the motion to finish, you have the option of continuing the rotation backwards, into a *German hang* (step 2) and dropping down.

REGRESSION: Bending the legs will make the hold easier.

PROGRESSION: Rotating even further backwards will make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; at this point continue by pressing your feet upwards, while straightening your trunk. Lock your legs and attempt to align your body; this is the first progression where you must actively brace yourself to stay straight. Hold the position. Reverse the movement smoothly and under as much control as possible.

- Instead of reversing the motion to finish, you have the option of continuing the rotation backwards, into a *German hang* (step 2) and dropping down.

REGRESSION: Bending the legs and trunk will make the hold easier.

PROGRESSION: Moving the thighs away from the bar will make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; at this point continue by pressing your feet upwards, while straightening your trunk. Lock your legs and align your body. Keeping tight, smoothly lower your straight body to a diagonal angle. Hold the position. Reverse the movement smoothly and under as much control as possible.

- Instead of reversing the motion to finish, you have the option of continuing the rotation backwards, into a *German hang* (step 2) and dropping down.

REGRESSION: Bending the legs and trunk will make the hold easier.

PROGRESSION: Lowering the body closer to horizontal will make the hold harder.

STEP 6: CLOSED TUCK BACK LEVER

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; at this point continue rotating with your knees bent until your chest is facing the floor. Keep your knees tucked under you. Hold the position. Straighten the legs and drop down safely, as for the *German hang* (step 2).

- Practice this alongside the *diagonal back lever* to train alignment.

REGRESSION: Maintaining a more diagonal trunk position (i.e., with the feet higher) will make the hold easier.

PROGRESSION: Begin to extend one bent leg backwards, into an *open tuck back lever* position (step 7) to make the hold harder.

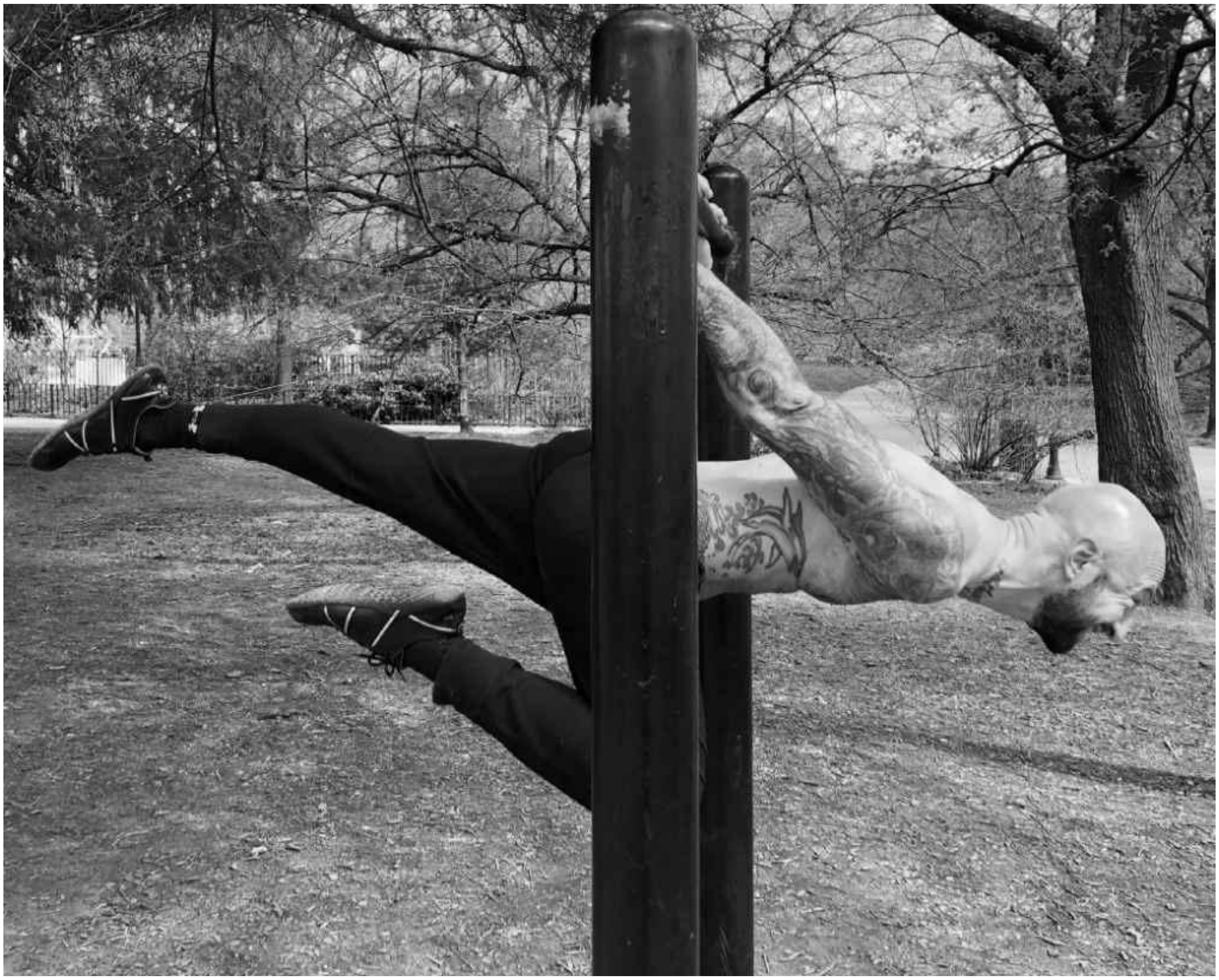
PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; continue rotating into a *closed tuck back lever* (previous page). Then uncurl your legs away from your trunk until your back is flat, and your knees are directly below your hips. Hold the position. Straighten the legs and drop down safely, as for the *German hang* (step 2).

- Work on smoothly untucking and re-tucking your legs to master this hold.

REGRESSION: Maintaining a more diagonal trunk position (i.e., with the feet higher) will make the hold easier.

PROGRESSION: Press the feet further out from you to make the hold harder.

STEP 8: ONE-LEG BACK LEVER



PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; at this point continue by pressing one foot upwards, while keeping the other one bent with the knee raised. Keeping tight, smoothly lower your straight body to a horizontal angle. Hold the position. Drop down safely, as for the *German hang* (step 2).

- Keep the trunk and extended leg braced and locked as straight as possible.

REGRESSION: Tucking the knee closer into your chest will make this hold easier.

PROGRESSION: Extending the tucked knee further out, away from the trunk, will make this hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; at this point continue by pressing your feet upwards, while straightening your trunk. Spread your straight legs apart as far as is comfortable. Keeping tight and aligned, smoothly lower your locked body down to horizontal. Hold the position. Drop down safely, as for the *German hang* (step 2).

- Focus on generating full-body tension while lowering into the horizontal hold position in order to keep your body aligned.

REGRESSION: Bending the knees while in the split will make the hold easier.

PROGRESSION: Bringing the legs closer together will make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and passing your feet under the bar; at this point continue by pressing your feet upwards, while straightening your trunk. Lock your legs and align your body. Keeping tight, smoothly lower your straight body to a horizontal angle. Hold the position. Drop down safely, as for the *German hang* (step 2).

- As well as great shoulder mobility and power, the *back lever* requires huge total-body isometric strength, just to keep the body aligned. In particular, the waist, abdominal and spinal muscles must work at peak levels.

REGRESSION: Bending the knees—so that your shins are vertical and parallel to your trunk—will make this hold easier. (This is called the *bent-leg back lever.*)

GOING BEYOND

The back lever will build terrific back, shoulder and midsection strength—but like all the Master Steps in bodyweight training, the journey to superhuman can continue almost indefinitely. There are always performance improvements to be made, even for the greatest of elite athletes. Once your back lever is solid, you can explore *dynamic* back levers; a much harder version which requires the athlete to lower down almost to vertical—still maintaining body alignment—before levering back up into the horizontal back lever. This requires enormous posterior chain power when performed for

reps. Many coaches see it as the closest bodyweight equivalent to super-heavy deadlifting.

23: FRONT LEVERS:
Ultimate Hanging Power

Danny Kavadlo is a master of the street workout—you'd be surprised the places you can find to bust out a front lever

FRONT LEVER
THE TEN STEPS

1. *3-point hang*

2. ***Inverse front hang***
3. ***Closed tuck front lever***
4. ***Open tuck front lever***
5. ***Diagonal front lever***
6. ***One-leg tuck front lever***
7. ***Bent-leg front lever***
8. ***One-leg front lever***
9. ***Split front lever***
10. ***MASTER STEP: Front lever***

The front lever is significantly different from, and more difficult than, the back lever due to the trunk position relative to the arms. (It's for this reason that the progressions for front levers are in a slightly altered order.) It's a great idea for athletes to have made some progress with back levers—having reached at least step 5—before exploring front levers. As with back levers, front lever progressions begin by helping the athlete get used to hanging inversely (steps 1-2). From there, the athlete learns the difficult skill of holding the trunk horizontally (steps 3-4), and then masters aligning the body (step 5) before leverage is gradually increased (steps 6-9) and the Master Step reached.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the rest of the body braced. Jump up, and bringing your knees high, rotate back until your insteps come into contact with the bar. Hold the position. Reverse the movement smoothly and under as much control as possible.

- Your grip needs to be strong to keep you safe while in this hold. If you cannot perform at least five pullups already, avoid this drill.

REGRESSION: Keeping the legs tucked in close to the body in the final position will make the hold easier.

PROGRESSION: To make the *3-point hang* gradually harder, move one or both insteps from the bar—just a few inches—and hold that position.

FRONT LEVER PROGRESSIONS STEP 2: INVERSE FRONT HANG

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the rest of the body braced. Jump up, and bringing your knees high, rotate back until your insteps come into contact with the bar; at this point continue by pressing your feet upwards, while straightening your trunk. Lock your legs and attempt to align your body. Hold the position. Reverse the movement smoothly and under as much control as possible.

- This hold is the front lever version of the *inverse back hang* (page 402). Due to the location of the bar, a completely vertical hold is impossible.

REGRESSION: Bending the legs and trunk will make the hold easier.

PROGRESSION: Straightening the trunk completely will make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, and rotate into a *3-point hang* (step 1) keeping your knees tucked close to your trunk. Keep your arms straight and maintain this position while lowering your trunk as close to horizontal as possible. Hold the position. Extend your legs and lower yourself down.

- Practice this alongside the *inverse front hang* (step 2) to train alignment.

REGRESSION: Maintaining a more diagonal trunk position (i.e., with the feet higher) will make the hold easier.

PROGRESSION: Begin to extend one bent leg away from the trunk, into an *open tuck front lever* position (step 4) to make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and tucked above you, lowering into a *closed tuck front lever* (step 3). Then uncurl ("open") your legs by pressing your knees away from your chest until your back is flat, and your knees are directly above your hips. Hold the position. Extend your legs and lower yourself under as much control as possible.

- Work on smoothly untucking and re-tucking your legs to master this hold.

REGRESSION: Maintaining a more diagonal trunk position (i.e., with the feet higher) will make the hold easier.

PROGRESSION: Press the feet further out from you to make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your bent knees high into a *3-point hang* (step 1); at this point continue by pressing your feet upwards, while straightening your trunk. Lock your legs and align your body. Keeping tight, smoothly lower your straight body to a diagonal angle. Hold the position. Bend your legs and lower yourself under as much control as possible.

- The *diagonal back lever* is placed before the tuck holds, but the *diagonal front lever* has to be placed afterwards due to its relative difficulty.

REGRESSION: Bending the legs or using a higher angle will make the hold easier.

PROGRESSION: Lowering the body closer to horizontal will make the hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your knees high and tucked above you, close to your trunk in *open tuck front lever* (step 4). Then uncurl one leg until your thigh is horizontal, and that shin vertical. Hold the position. Extend your legs and lower yourself under as much control as possible.

- Practice this alongside the *diagonal front lever* (step 5) to train alignment.

REGRESSION: Only extending the leg part way towards horizontal will make the hold easier.

PROGRESSION: Gradually extending the tucked leg outwards to match the opposite leg will make this hold harder and lead you perfectly to the next step.

STEP 7: BENT-LEG FRONT LEVER

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your bent knees high into a *3-point hang* (step 1); at this point straighten your legs upwards, and then bend at the knee, keeping the trunk and thighs aligned. Maintaining this position, smoothly lower your straight body to horizontal. Hold the position. Extend and lower safely.

- Instead of fixing your position and lowering, you can simply extend your knees out from the *open tuck front lever.*

REGRESSION: Bending at the waist or holding a more diagonal angle will make this hold easier.

PROGRESSION: Straightening the legs to any degree will make this hold harder.

STEP 8: ONE-LEG FRONT LEVER

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your bent knees high into a *3-point hang* (step 1); at this point continue by pressing one foot upwards, while keeping the other one bent above your trunk. Keeping tight, smoothly lower your straight body to a horizontal angle. Hold the position. Lower yourself down as smoothly as possible.

- Keep the trunk and extended leg braced and locked as straight as possible.

REGRESSION: Tucking the knee closer into your chest will make this hold easier.

PROGRESSION: Extending the tucked knee further out, away from the trunk, will make this hold harder.

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your bent knees high into a *3-point hang* (step 1); at this point continue by pressing your feet upwards, while straightening your trunk. Spread your straight legs apart as far as is comfortable. Keeping tight and aligned, smoothly lower your straight body to horizontal. Hold the position. Lower yourself down as smoothly as possible.

- With most advanced levers you will probably not be able to hold horizontal as first; if so, just *lower as slowly as possible from the top position.*

REGRESSION: Bending the knees while in the split will make the hold easier.

PROGRESSION: Bringing the legs closer together will make the hold harder.

MASTER STEP: FRONT LEVER

PERFORMANCE: Grip the bar with a shoulder-width grip, keeping your shoulders tight and the body braced. Jump up, bringing your bent knees high into a *3-point hang* (step 1); at this point continue by pressing your feet upwards, while straightening your trunk. Lock your legs and align your body. Keeping tight, smoothly lower your straight body to a horizontal angle. Hold the position. Lower yourself down as smoothly as possible.

- Performed correctly, the *front lever* looks elegant and almost easy—however nothing could be further from the truth. This exercise is a feat of ultimate total-body power and builds huge strength, from neck to toes.

REGRESSION: At first, alignment will not be perfect; the waist will sag, the knees will bend. With frequent practice, a perfectly straight body can be maintained.

It might seem impossible to make the front lever even harder, but it can be done. As for back levers, you can turn the isometric hold into a ferociously brutal dynamic exercise, by levering your entire body up and down for reps, while retaining perfect iron alignment. Another

variation—probably not attainable by mortals—involves bringing the body closer to vertical. Due to leverage, the forces going through the shoulder in this hold would be almost unbelievable. This semi-mythical version was achieved by the legendary calisthenics master Jasper Benincasa, and dubbed the CTI—*Close to Impossible.*

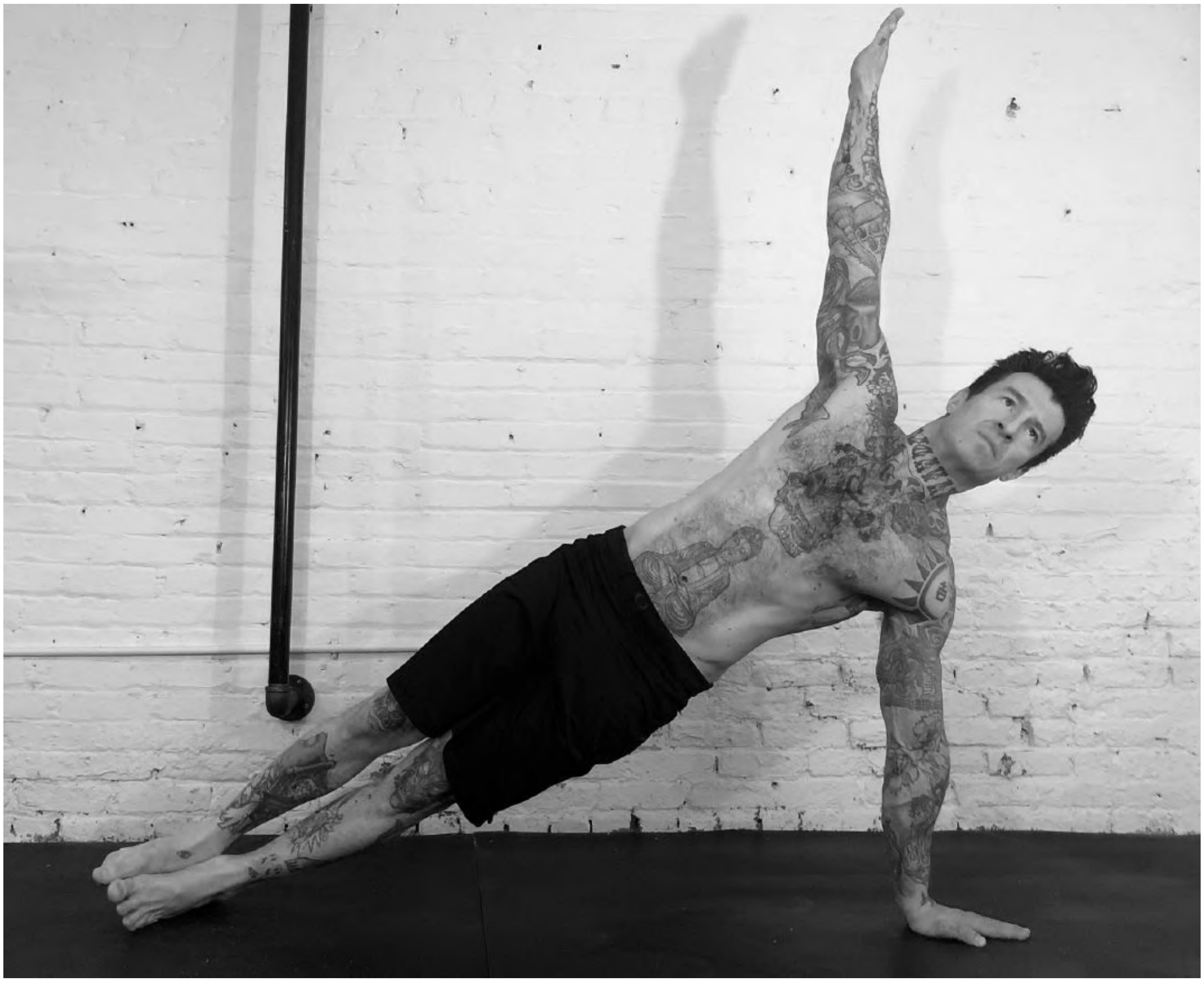
24: FLAG HOLDS:
Titanium Lateral Chain

HUMAN FLAG
THE TEN STEPS

1. ***Side push-up plank***
2. ***Side classic plank***
3. ***Tuck clutch flag***
4. ***One-leg clutch flag***

5. ***Clutch flag***
6. ***Press hold***
7. ***Vertical chamber flag***
8. ***Vertical press flag***
9. ***One-leg press flag***
10. ***MASTER STEP: Human flag***

The front lever is significantly different from, and more difficult than, the back lever due to the trunk position relative to the arms. (It's for this reason that the progressions for front levers are in a slightly altered order.) It's a great idea for athletes to have made some progress with back levers—having reached at least step 5—before exploring front levers. As with back levers, front lever progressions begin by helping the athlete get used to hanging inversely (steps 1-2). From there, the athlete learns the difficult skill of holding the trunk horizontally (steps 3-4), and then masters aligning the body (step 5) before leverage is gradually increased (steps 6-9) and the Master Step reached.



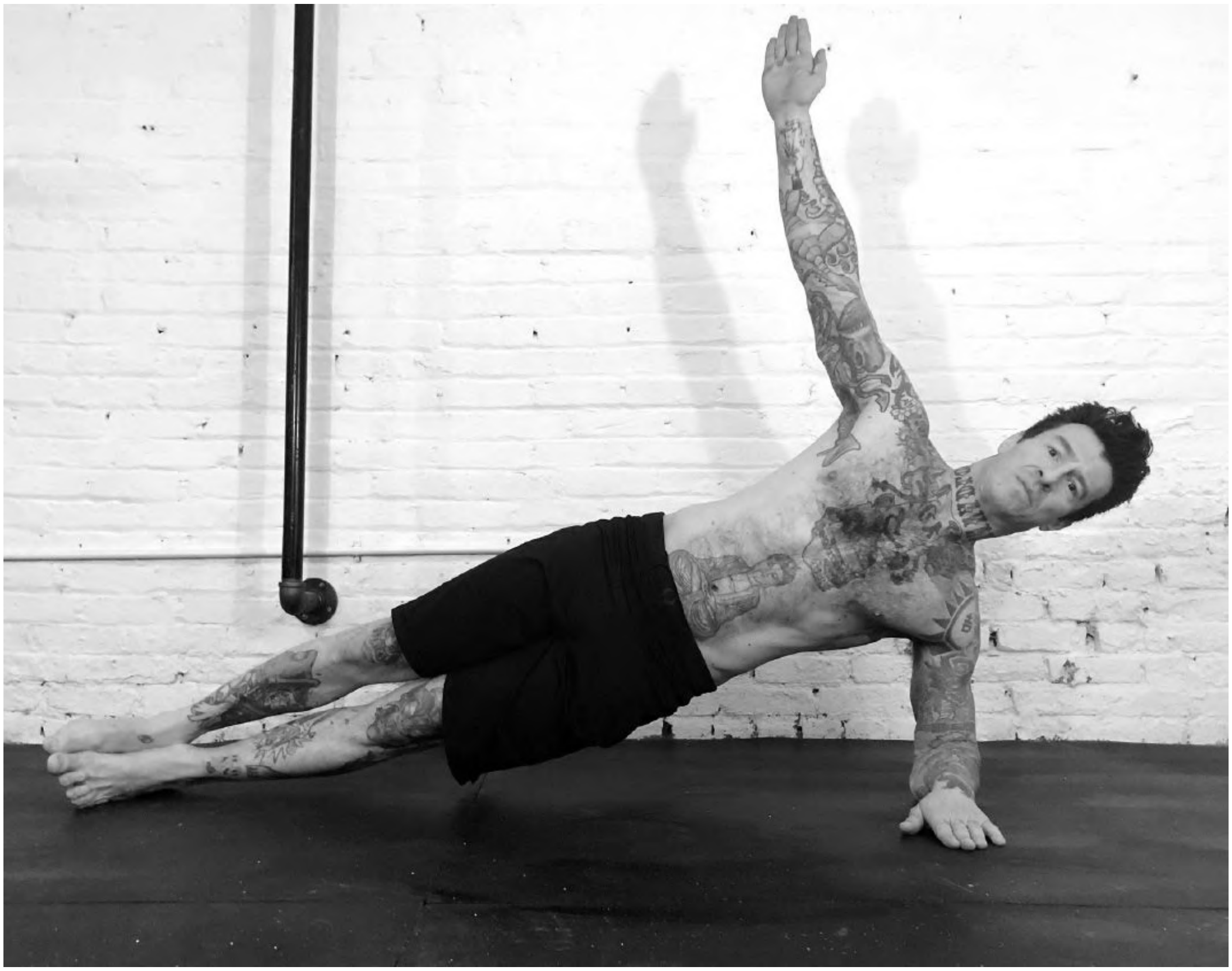
PERFORMANCE: Get into a push-up position, with the arms straight. Rotate 90 degrees, by taking one hand off the floor and pointing it upwards, and placing the leg (same side) on top of the opposite leg. Ensure your entire body is aligned—legs, hips, trunk, neck—with legs and loaded arm straight also. Hold the position. Reverse the motion to finish the hold.

- Keep the entire body locked and braced; avoid any sagging at the hips.

REGRESSION: Bending the legs and resting on the side of the lower knee—rather than the side of the lower foot—will make this hold easier.

PROGRESSION: Placing the feet higher up (on a raised base) will make this hold harder.

STEP 2: SIDE CLASSIC PLANK



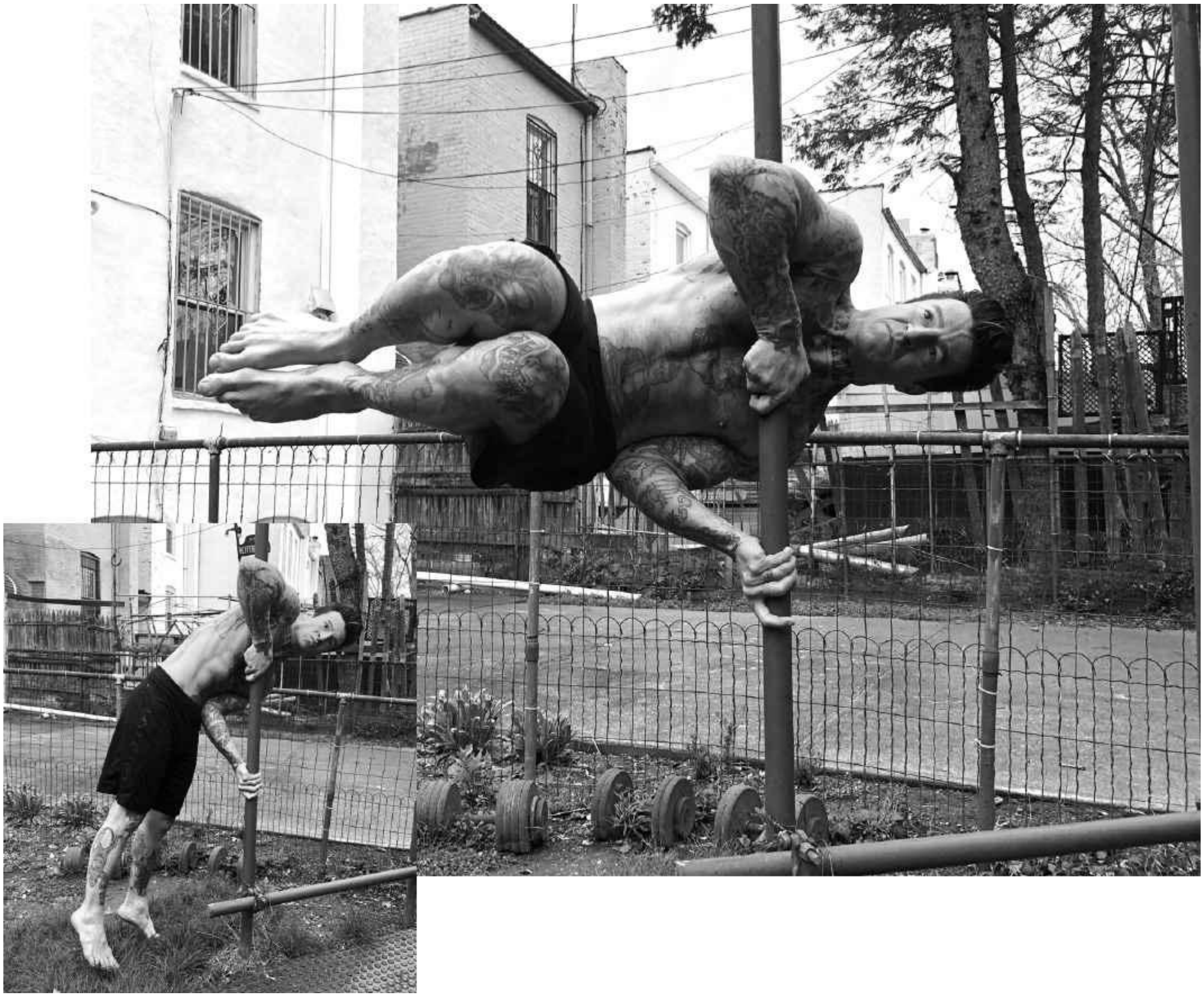
PERFORMANCE: Lie sideways, supporting yourself with your forearm. Extend your legs out to the side, with the top foot resting on the lower one, and contract your lateral chain, raising your hips off the floor. Ensure your entire body is aligned—legs, hips, trunk, neck—with your legs locked. Hold the position. Reverse the motion to finish the hold.

- Keep the entire body locked and braced; avoid any sagging at the hips.

REGRESSION: Bending the legs and resting on the side of the lower knee—rather than the side of the lower foot—will make this hold easier.

PROGRESSION: Raising your upper leg into the air (keeping it locked straight) will make this hold harder.

STEP 3: TUCK CLUTCH FLAG



PERFORMANCE: Place your upper lat/armpit into a vertical pole. Keeping in tight, bend the upper arm and place your forearm on the pole, gripping it as much as you can (*inset*). Grip the pole with your other hand (about hip height), with the forearm diagonal. Squeeze the bar or pole as hard as possible. Kick yourself up onto your lower forearm, tucking your legs into your chest. Hold the position. Reverse the motion to finish the hold.

- Your lower elbow and forearm function as a strut to hold your weight.

REGRESSION: You can approach this hold by working on the upper-body/hand position first and lifting your feet, allowing your body to hang down diagonally.

PROGRESSION: Extending the legs slightly will make this hold harder.

STEP 4: ONE-LEG CLUTCH FLAG

PERFORMANCE: Place your upper lat/armpit into a vertical pole. Keeping in tight, bend the upper arm and place your forearm on the pole, gripping it as much as you can (*inset*). Grip the pole with your other hand (about hip height), with the forearm diagonal. Squeeze the bar or pole as hard as possible. Kick yourself up onto your lower forearm, tucking your legs into your chest. Now extend one leg fully. Your leg should be horizontal and aligned with your hips and trunk. Hold the position. Reverse the motion or lower the legs to finish the hold.

- In all clutch flag variations, your higher arm prevents you from pivoting.

REGRESSION: Keeping the extended leg slightly bent will make this hold easier.

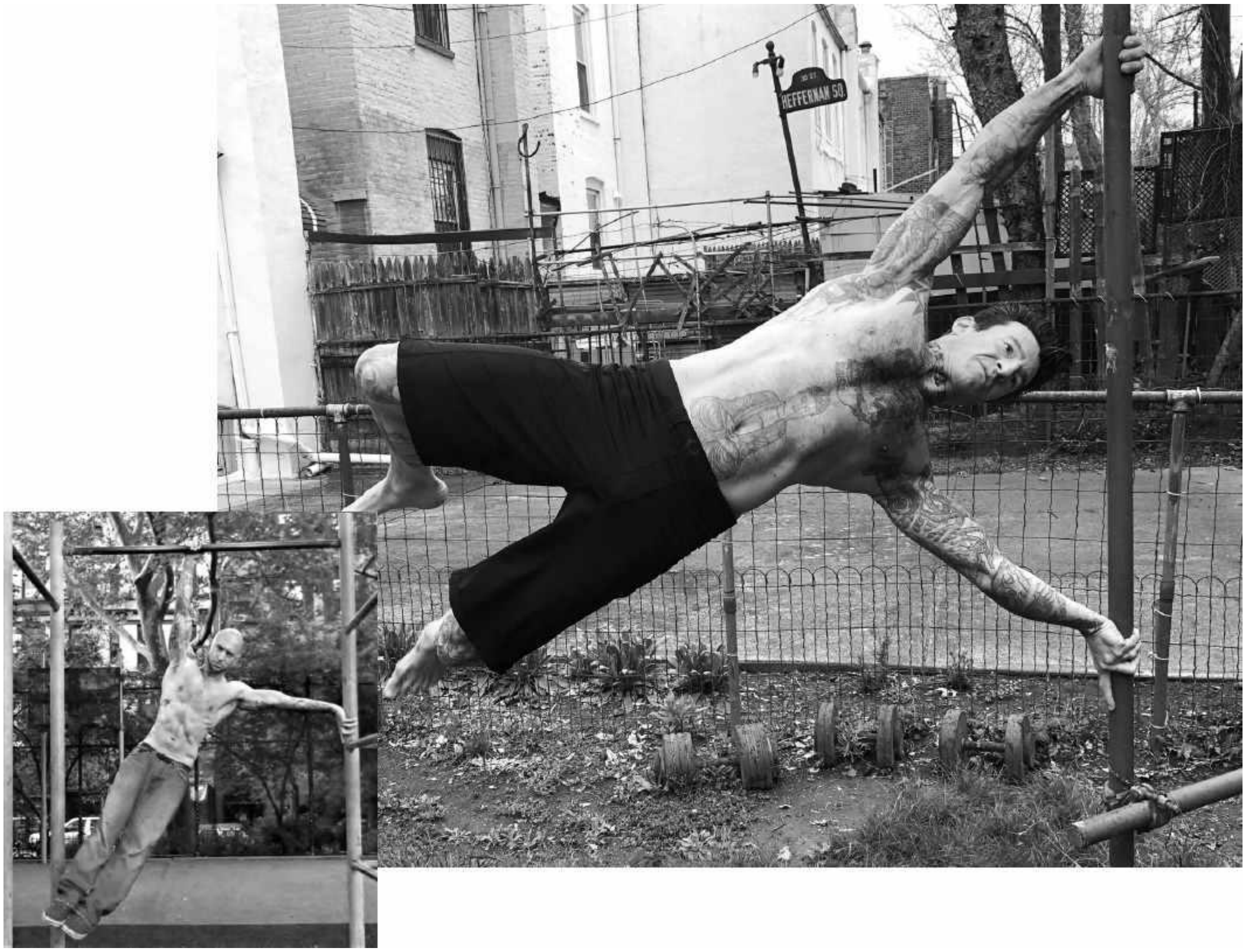
PROGRESSION: Extending the tucked leg slightly will make this hold harder.

PERFORMANCE: Place your upper lat/armpit into a vertical pole. Keeping in tight, bend the upper arm and place your forearm on the pole, gripping it as much as you can (*inset*). Grip the pole with your other hand (about hip height), with the forearm diagonal. Squeeze the bar or pole as hard as possible. Kick yourself up onto your lower forearm, tucking your legs into your chest. Now extend both legs fully. Your legs should be horizontal and aligned with your hips and trunk. Hold the position. Reverse the motion or lower the legs to finish the hold.

- The *clutch flag* is an essential step towards mastering press flags.

REGRESSION: Keeping the legs slightly bent will make this hold easier.

PROGRESSION: As you improve you can lever the legs straight up without tucking.



PERFORMANCE: With one arm, grip the pole at a point about hip/upper thigh level, index finger pointing down. Lock your arm straight, and reach up, gripping the pole thumb down with your other hand. Turning side-on, pull hard with the upper arm and push hard with the lower one. When you have built enough torque, hop off the ground, bend your legs, and try to support your weight for a few seconds. Lower the legs to finish the hold.

- The *press hold* is an excellent transitional drill to help athletes become accustomed to the unusual pulling/pushing aspect of advanced flag holds.

REGRESSION: If the positioning is tricky, work on drilling it using any kind of right-angle base (*inset*). This is called a *support press.*

PROGRESSION: Pulling the body closer to horizontal will make this hold harder.

PERFORMANCE: With one arm, grip the pole at a point about hip/upper thigh level, index finger pointing down. Lock your arm straight,

and reach up, gripping the pole thumb down with your other hand. Turning side-on, pull hard with the upper arm and push hard with the lower one. When you have built enough torque to support your weight, kick yourself up hard, explosively pulling your knees above you. When your trunk is as close to inverse as possible, hold the position. Lower the legs to finish the hold.

- Expect to drill this many, many times to find the correct balance.

REGRESSION: Begin by just trying to kick/pull your knees up over your trunk.

PROGRESSION: Extending the legs will make this hold harder.

HUMAN FLAG PROGRESSIONS   STEP 8: VERTICAL PRESS FLAG

PERFORMANCE: With one arm, grip the pole at a point about hip/upper thigh level, index finger pointing down. Lock your arm straight, and reach up, gripping the pole thumb down with your other hand. Turning side-on, pull hard with the upper arm and push hard with the lower one. When you have built enough torque to support yourself, kick yourself up hard into a *vertical chamber press* (step 7). Extend your legs fully upwards until the entire body is inverse, aligned, and close to vertical. Hold the position. Lower the legs to finish the hold.

- The vertical position is harder on the lower arm, but easier on the core.

REGRESSION: Bending the legs will make this hold easier.

PROGRESSION: Lowering the body closer to diagonal will make the hold harder.

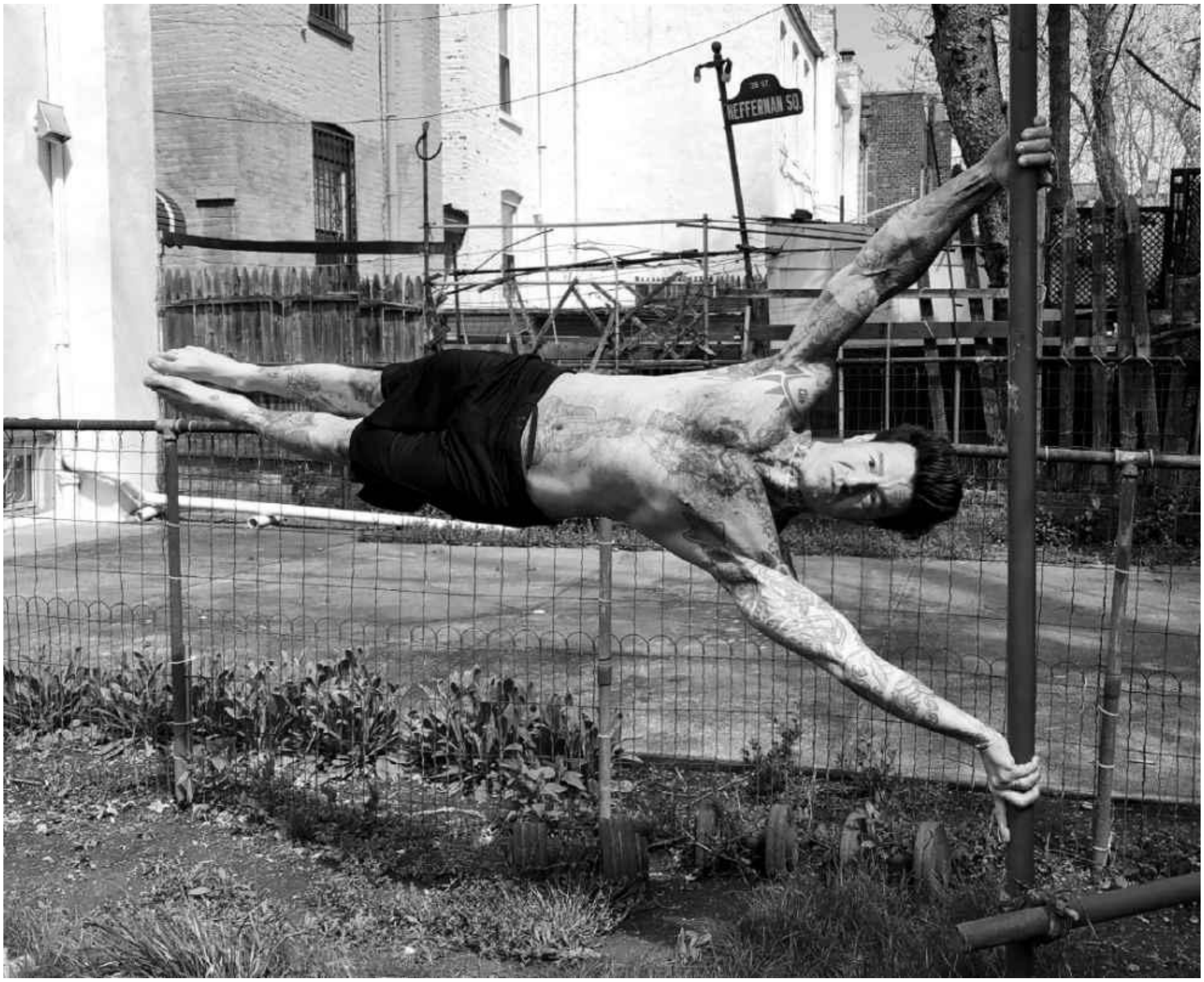
HUMAN FLAG PROGRESSIONS STEP 9: ONE-LEG PRESS FLAG

PERFORMANCE: Grip the bar as for the previous two steps. Turning side-on, pull hard with the upper arm and push hard with the lower one. When you have built enough torque to support yourself, kick yourself up hard into a *vertical chamber press* (step 7). Extend the lower leg fully upwards, while keeping your upper leg bent. Your entire body should be inverse, with the lower leg, hips and trunk aligned, and close to vertical. Keeping that relative position fixed, lower the entire body to horizontal. Hold the position. Lower the legs to finish the hold.

- As with all press flags, you can just kick out into the position, rather than lowering. Lowering makes the technique easier for most athletes, though.

REGRESSION: Keeping the upper leg tucked in well will make the hold easier.

PROGRESSION: Extending the upper leg will make the hold harder.



PERFORMANCE: Grip the bar as for the previous three steps. Turning side-on, pull hard with the upper arm and push hard with the lower one. When you have built enough torque to support your weight, kick yourself up hard into a *vertical chamber press* (step 7). Extend your legs fully upwards until the entire body is inverse, aligned, and close to vertical. Keeping that alignment fixed, lower the entire body to horizontal. Hold the position. Lower the legs to finish the hold.

- Strength athletes hear a lot about the posterior chain and the anterior chain. What about the *lateral chain*—the sides of the body? *Press flags* are the *ultimate* lateral chain exercise and will forge you

muscles of pure steel.

REGRESSION: Bending the legs (the *bent-leg press flag*) will reduce the leverage and make this hold easier.

How about a *one-arm human flag?* (Just joking kids—don't try this at home.) The human flag is truly an elite-level iso. As with the back and front levers, you can make it more difficult by levering *up* into the position, as opposed to kicking up into a vertical position and lowering *down*. This makes things much, much harder. Truth be told however, most athletes should feel proud just to hold a steady press flag for two or three seconds. The World Record for the flag is under 40 seconds, and that's held by the "flag man" Dominic Lacasse, an elite level gymnast who devoted many years specializing on this technique.

Lights Out!

There you have it—the *Convict Conditioning* approach to bodyweight isometrics. Six different "families" of holds working the entire body, each with ten steps leading up to mastery. It's simple. It's logical. It's time-tested and proven. But to get the most out of this system, you need one final secret. It's this: *bank your strength.*

What does this mean? Put simply—don't rush. Work hard on each step, however easy it might seem. Milk it for all it is worth, all it can teach you, and all the strength you can eke from it. Before moving on, explore and experiment with any "hidden steps" you can find, making your current step harder in tiny, progressive amounts. All strength training—all training—is based on diminishing returns. *The more advanced your training, the less you get from it.* For this reason, never regret working hard with earlier steps; this is where you make your best gains. Regret it when you are finally forced to move to the next step!

If athletes fail at mastering these isos, if they stumble and fall at the later steps, I promise you this—*this is where they went wrong*. They didn't milk the steps for all they were worth. They didn't bank their strength. If you approach your training religiously and with this mindset, you cannot fail—you will reach heights of ability you can barely dream of now. The information in this section can revolutionize any human being, and turn them into a true *monster* of strength—not like the big, bloated, 'roided-up, red-faced bodybuilders you typically see, but a different kind of strong. A *special* kind of strong—strong in the deep tissues, the trunk, the spine, the midsection, the hands, the tendons. The sleek, real-world kind of strength that makes you healthier, harder to kill, and frighteningly dangerous in a street fight. The kind of strength treasured by the old-school strongmen, rather than the jacked-up *YouTube* celebrities of today.

This strength is waiting for you. All you have to do now is lock yourself in, and get training.

BONUS CHAPTER
Isochain Plus the Weights? The Best of Both Worlds!

By Paul Wade

Seriously—do you really expect this to replace regular training?

Since information about the Isochain was first released to the public, this question has come up over and over. The answer is yes.

...And no.

Yes, the Isochain is a viable form of resistance training. Isometric work will make you stronger. It will make you bigger, too, if that's how you use it. So many studies have proven this now, nobody who knows what they're talking about will dispute it. Motor units follow the *all-or-none law.* They either contract or they don't. There is nothing magical about picking weights up and putting them down again, and there never has been. If you want to get bigger and stronger, you don't need to do it. (Cue the shock, outrage, fainting, explosive diarrhea, etc.)

What about the "no"?

Well, picking up weights and putting them down again will make you bigger and stronger, too. It always has. If you want to specifically get better at hoisting weights up and down, you should practice it. Additionally, some of you are passionate about the iron. The gym. You love it. It's part of your life history, your lifestyle. You can't picture being without it.

Life isn't binary, and your training shouldn't be, either. It's *not* a question of the Isochain vs conventional methods. *You can use both.* The more tools

you have in your toolbox, the faster you can reach your training goals. The Isochain is just a very, very versatile and powerful tool.

In this article, I'm gonna show you ten ways you can mix-and-match conventional in-gym workouts with Isochain isometrics to send your strength through the roof.

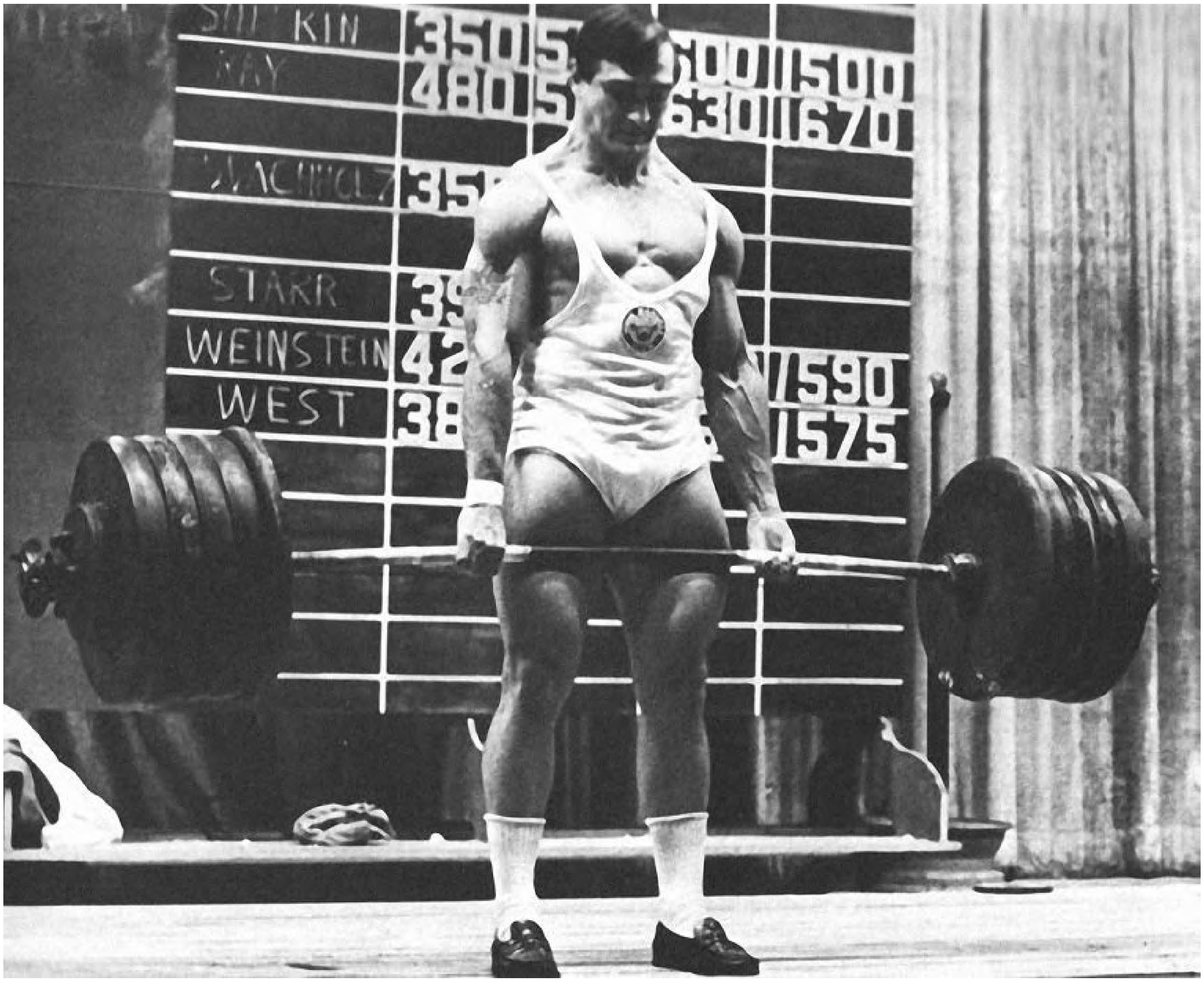
You asked for the best of both worlds? You got it, baby!

I. Alternate the gym with Isochain sessions

Isometrics is the most powerful method that exists for increasing absolute strength (if anyone doubts that, they don't understand what absolute strength is). Studies have shown increases in strength of 5% per week during isometrics programs (Barnham, 1960). You can double your strength in twenty weeks with isometrics, performed correctly.

Isometric strength increases DO translate into dynamic strength increases (Lum & Barbosa, 2018). Even if you are only truly passionate about hoisting the iron, you'd be crazy not to utilize scientific isometrics to increase your overall strength in the gym—elite powerlifters and weightlifters do just that.

A great way to do this is to perform an Isochain session at home, on non-training days. Let's say you lift on Monday, Tuesday, Thursday and Saturday—an excellent approach to isometrics would be to perform an Isochain workout on Wednesday and Sunday. If you lift three times per week, perform an Isochain session on three non-gym days.



The legendary coach Bill Starr was a lifelong champion of isometrics. Sure didn't hurt his regular lifting.

Isochain training is convenient, brief, and doesn't cut into your recovery reserves dramatically, if done right. Most importantly, it amplifies total-body strength very rapidly.

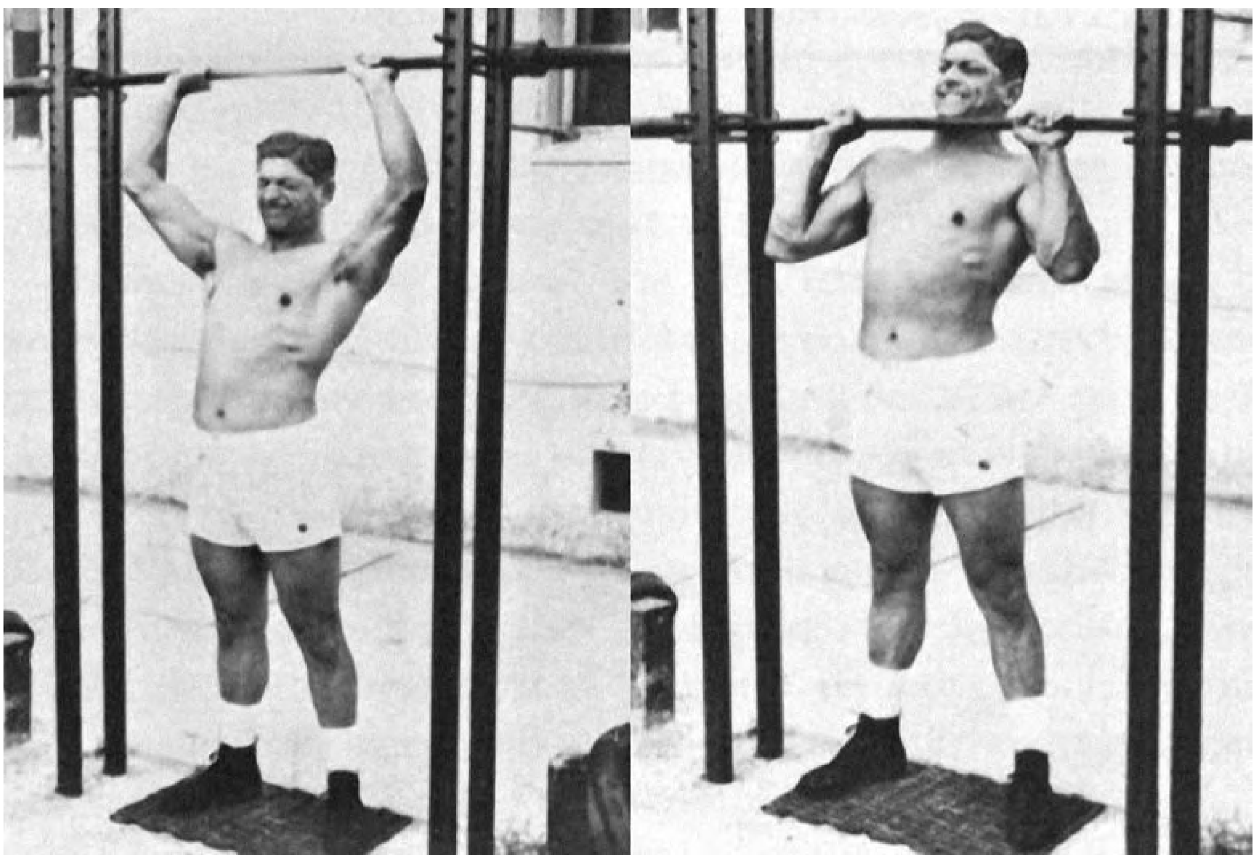
Why would any athlete *not* want these benefits?

II. The Isochain as a warm-up tool: instant 20% strength increase

Got no interest in static training? You all about moving that bar/cable/kettlebell? Yeah, buddy!

Hold up though, kid. What if I could offer you a sweet little hack to get *better* at lifting your weights of choice? What if a few seconds investment in isometrics could make you a MASSIVE *twenty percent* stronger in your lifts? Got your attention now, big boy? Good, because I've got a real beauty for you, here.

Mel Siff's legendary manual *Supertraining* revealed to the world that isometric holds prior to dynamic lifting will make you more powerful in those lifts by up to *one-fifth.* This is true, even for advanced lifters; it's called the "immediate after-effect" of isometric work, and is a result of amplified neurological facilitation. Simply use the Isochain as part of your body-part/technical warm up, and *boom*—months' worth of strength gains, in seconds.

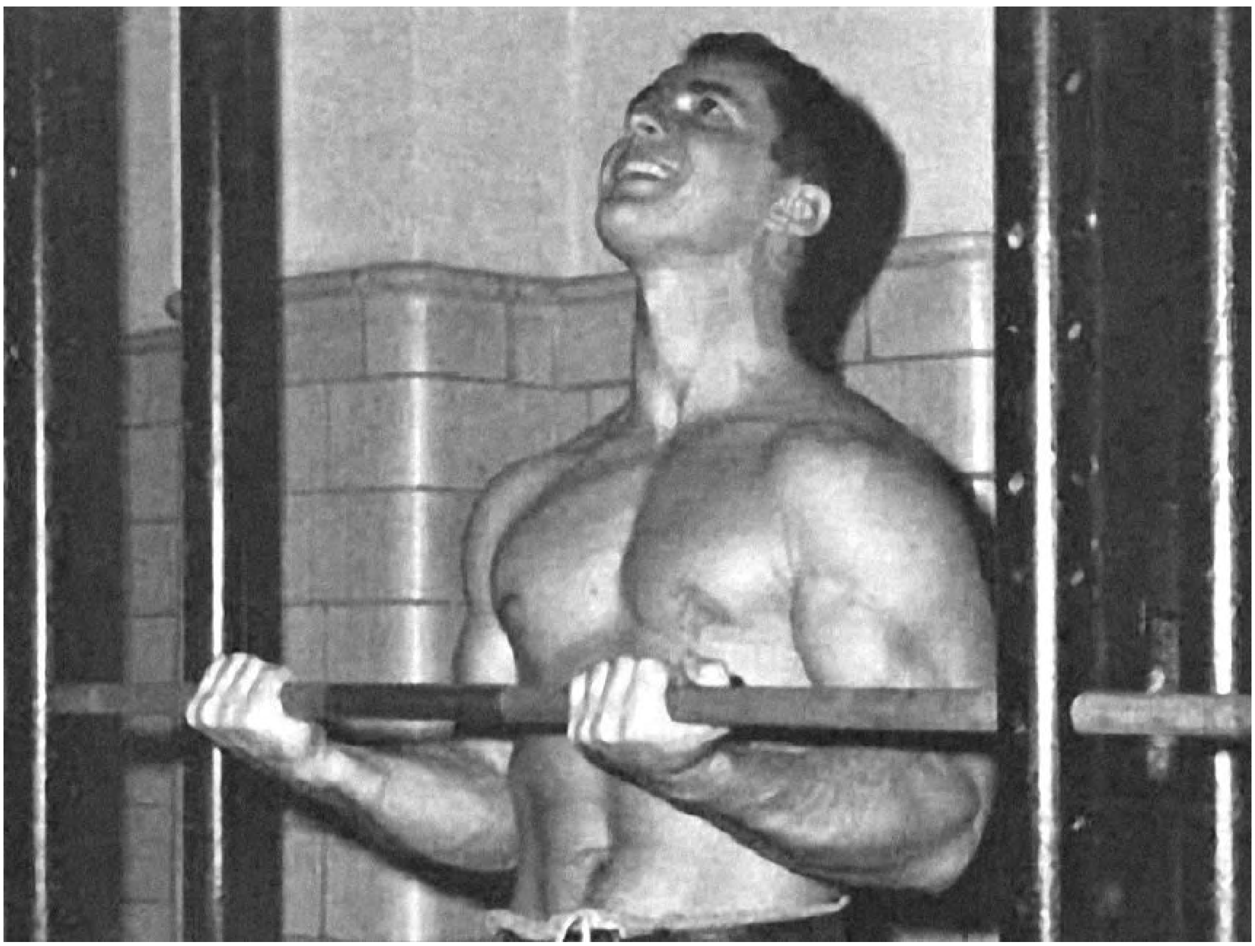


III. Isochain methods as a specialization tactic

Been using conventional workouts in the gym for a while? One area (or more) just never seeming to make the gains you wanna see? Like the man

Steve Tyler said: *if you do what you've always done, you'll always get what you always got*.

Isometric sessions with an Isochain involve higher forces, superior neurological recruitment, and greater levels of time-under-tension than conventional weight-training. In addition, an Isochain allows athletes to record, track and forcibly impel their progress forward scientifically, with a high degree of accuracy. These are pretty kick-ass conditions for anyone wanting to improve on a lagging body-part in a compressed timeframe.



Isometric biceps training, circa 1964

Pick a muscle or area you need to improve, and work that area (and *only* that area) twice per week with the Isochain, *on days off from the gym*. Select two isometric drills for the selected muscle group. Use six reps of 6-seconds, increasing your Target Load level by 5% every time you can perform all six

full holds with that weight. Finish each drill with two 30-second holds, measuring your average force and increasing it whenever you can.

The Ultimate Isometrics Manual includes multiple useful Isochain drills for any given body-part; biceps, deltoids, glutes, forearms, lats, etc.

I don't care how "genetically inferior" a muscle is, if you punish it like this for just a month or two, it'll explode into new size and strength. It won't have a choice.

IV. Isochain training as a periodization mesocycle

This suits athletes or coaches who don't wish to mix-and-match isometric and conventional lifting methods; you just do one or the other, not both together. *Periodization* involves setting aside different "mesocycles" of the training year to commit fully to specific training goals, such as power, speed, or hypertrophy. One approach, popular with the Soviets, was to commit one block to building elite-level isometric strength.

Train hard using *only* isometrics for 4-8 weeks. If you have not performed isometrics for several months, you will gain strength *extremely* rapidly. Just as diminishing returns set in, instead of varying your isometrics routine to make further gains, simply quit and move to the next block of the periodization plan—i.e., go back to the regular weights. After six months or a year, return to the isometrics fresh and repeat, to keep karate kicking your strength up to higher and higher levels. This is the approach suggested by the mighty Pavel Tsatsouline.

The legendary coach Bill Starr was a lifelong champion of isometrics. Sure didn't hurt his regular lifting.

V. Isochain training as a solution for busted-up tough guys

Sadly, some athletes find themselves giving up on conventional weights due to the *pain*. While we were assessing the third prototype of the Isochain, I was introduced to a guy who had given up lifting five or six years back, due to osteoarthritis of the knees. Decades back, in his early twenties, this dude—let's call him "Stu"—busted up his knees playing football, the right apparently much worse that the left. Over the years he had one ACL replacement and multiple meniscus tidy-ups. These ultimately left his knees with less cartilage than ever, and by his late forties he was plagued by such intense knee pain he resorted to Tylenol daily just to get around.

Stu also loved training with weights—he was a real garage gorilla—but found he could do less and less because his knees hurt so bad after training, sometimes for days. First squats went, then deadlifts; then he quit rows and standing exercises. By that time, he figured "if I can't do the basics, why

bother?" and hit the gym less and less regularly until he finally quit altogether, around three years back.

At the time I met Stu he was in his early fifties. When we assessed him on an Isochain, we performed all his beloved basics: squats, stiff-legged deadlifts, rows, and so on. Stu had some knee pain after the first few sessions, but once the break-in period subsided, he discovered something amazing; not only could he perform isometric squats and deadlifts without the crunching, grinding and pain, but he could actually use *more weight* than he did in his prime.

Plus, once he got over that initial scar-tissue conditioning phase, his knees not only didn't hurt after training—*they pretty much didn't hurt at all.* In his words, they felt "amazing". Researchers are only now beginning to uncover the remarkable power of isometrics to *actively and dramatically reduce joint pain*—the opposite effect regular training generally has (Rio, 2015).

Stu is now back actively training in his garage, Monday, Wednesday and Friday. He lifts dumbbells, barbells and kettlebells—heavy!—for his upper-body on these days. On Tuesday, Thursday and Saturday, he does max iso deadlifts, squats and calf raises at home on a prototype Isochain. He says he's never felt better, and I gotta admit, the kid's looking brutally strong.

He has also quit the Tylenol—if his knees ache, he trains them!

VI. The Isochain as a perfect travel gym

This one's a no-brainer.

The original chain-and-bar devices were perhaps the most convenient strength tool ever developed; light, easy to carry, easy to store, and hugely versatile

Isometrics—along with bodyweight!—has *always* been the go-to choice for athletes on a vacation or a work trip, to retain and improve their strength and conditioning levels. This is one of the traditional reasons isometrics were praised by pragmatic coaches.

An Isochain weighs only a few pounds and will easily fit into the trunk of any car. With it, an athlete can get an elite-level resistance training program in—squats, presses, rows, curls, deadlifts, and all the most productive exercises with up to a *thousand pounds* of resistance. An Isochain workout is quick, refreshing (rather than exhausting), scientifically measurable, and won't interfere with your trip.

The perfect solution.

VII. Using the Isochain to dominate "sticking points"

A very specialist means of using isometrics is as a method to overcome the "sticking point" in a dynamic lift (often the deadlift, squat or press, but any lift, really). This approach has been used in virtually all strength sports.

The most direct manner of addressing a sticking point is by employing partial repetitions or isometric training.

-Kompf and Arandjelović: *Understanding and Overcoming the Sticking Point in Resistance Exercise* (2016)

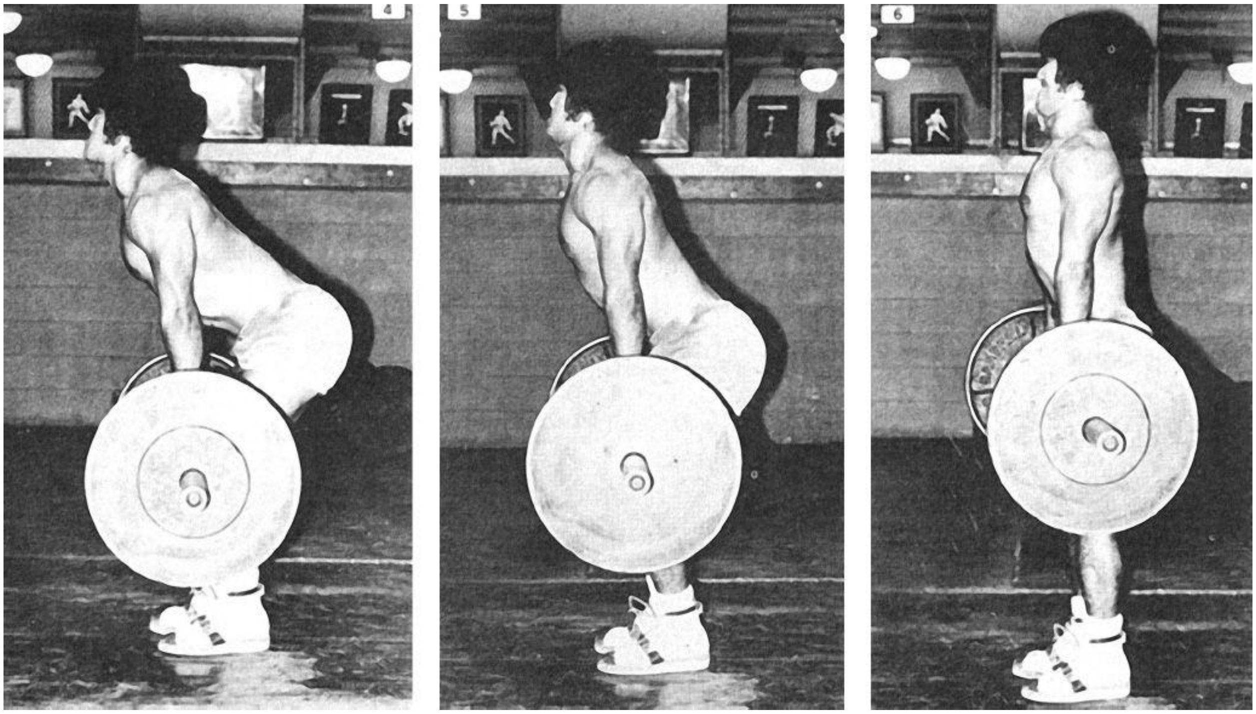
Every lift has a sticking point—a particular angle, usually pretty small, where the bar speed slows, and which determines whether the lift will be made or failed. It stands to reason that all serious lifters want to improve their sticking points on lifts, because sticking points are the weakest link in the movement. You get stronger in a sticking point, you get stronger in that lift.

Muscles typically gain strength through their entire range. But the Law of Specificity applies: if you want to get good at something, do it often. if you are stalling at a specific part of a lift, repeatedly working that limited range-of-motion will increase your lifting skills *in that range*. In addition, isometric work:

...offers a greater potential than dynamic exercises for visual and kinesthetic cues to hold any given position. This gives isometrics a distinct advantage for studying and correcting errors.

-Verkhoshansky

It will also provide an invincible *psychologica*l boost: if your regular deadlift keeps stalling at 405lbs, and you get strong enough to isometrically smash the sticking point with 450lbs, you'll be more confident next time you attempt a dynamic max. How could you not be?



You can do this training in the gym or at home. Warm up well, and set the Isochain bar close to the sticking point of the lift you are working to improve. Build up to 10 single max reps of 5 seconds, pulling/pushing against the bar as hard as possible. Bingo—a few weeks of this, and the portion of the lift which was once a struggle now seems like a cake walk.

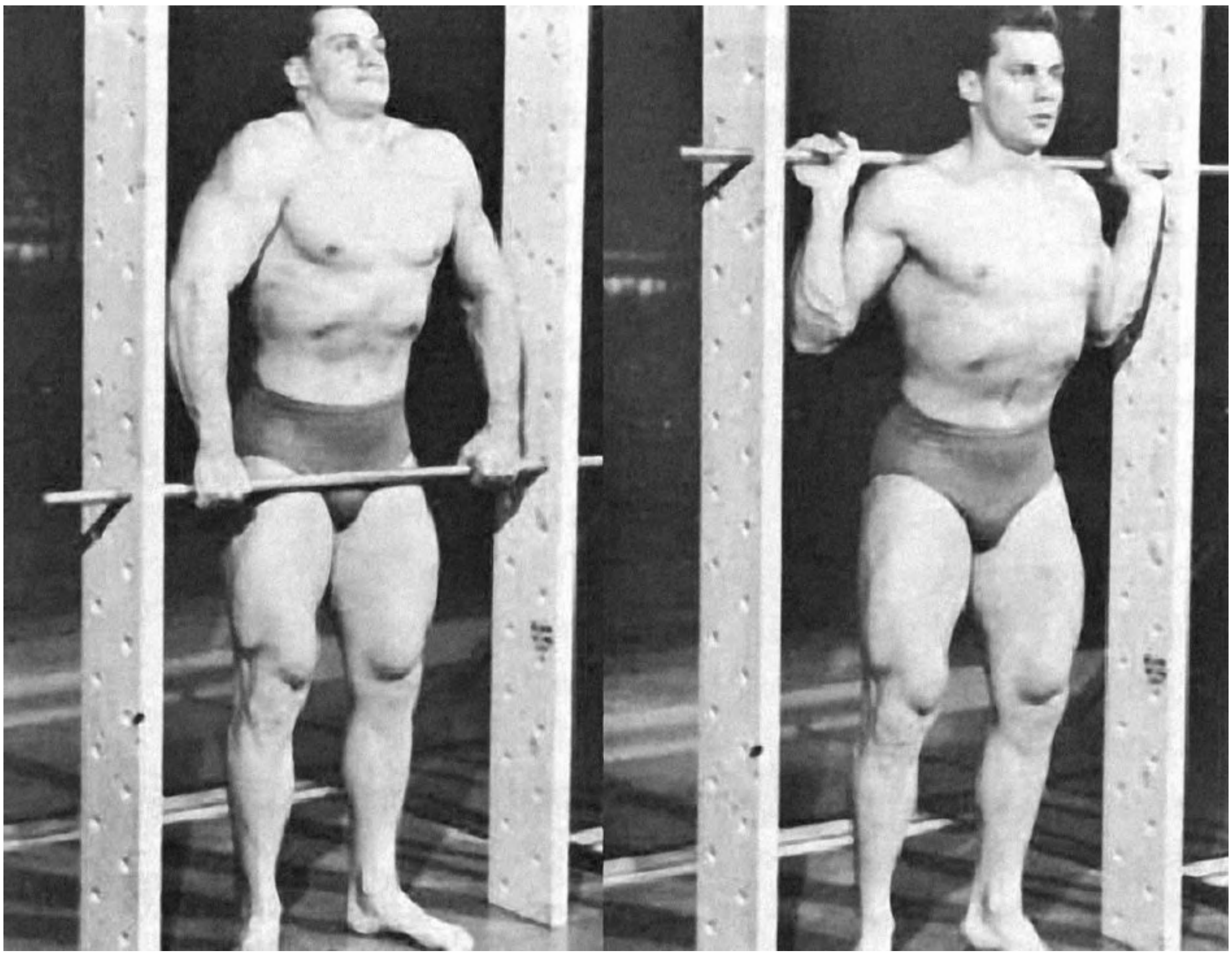
(Another useful trick, straight from the Soviet researchers: a lift will keep moving for a few degrees even *after* the muscles begin to fail—so when applying this methodology, pick a bar location slightly *below* your apparent sticking point.)

VIII. Use the Isochain to avoid deconditioning during longer layoffs

Many athletes find themselves training hard part of the year, and then laying-off for various reasons—losing their gains and becoming frustrated. Some of this may be due to work and family commitments; some may well be seasonal. If you can't face trudging into the garage to pump iron in winter because of the snow and ice, or if you can't find the time to get to the gym in

the summer because the beach is calling, you can depend on the trusty Isochain to get you through these periods.

Isochain training sessions are convenient and fast, and you can keep (and even *build on*) your hard-earned strength and muscle gains, ready for the glorious day you hit that gym again.



IX. Isochain as rehab technology

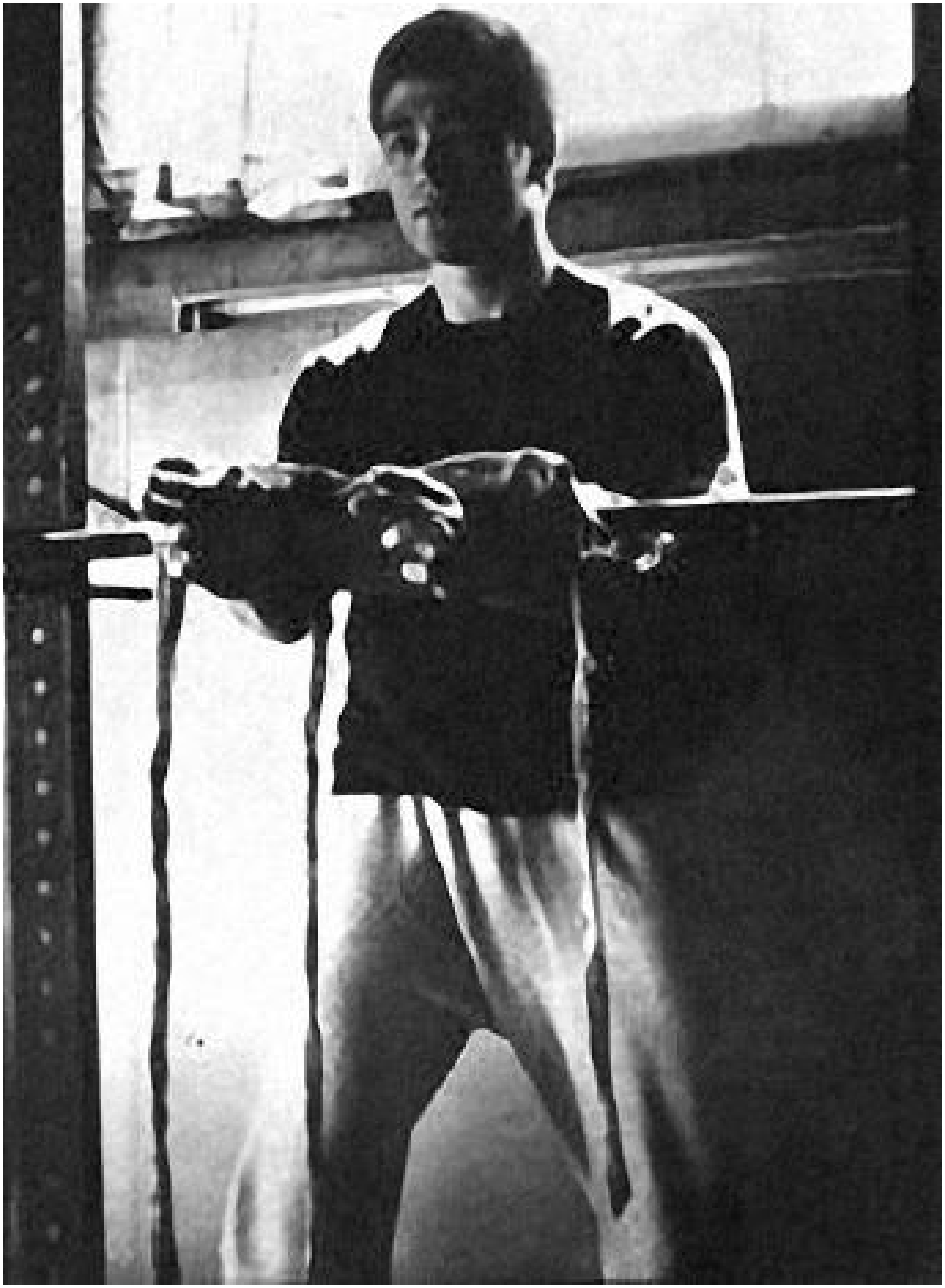
Isometrics and rehabilitation go hand-in-hand, and they always have. There are three major reasons for this. Firstly, isometrics is *autoregulated;* your own body determines the force levels required, *not* the demands of an external load. Secondly, the joints—often the source of pain—remain static and protected. Thirdly, there is zero momentum or extension during isometric drills, the usual causes of re-injury.

If you are coming back from an injury/injuries, need some prehab work, or just want to be careful getting back into it when you're out-of-shape, the Isochain is the safest, most productive, most logical technology to use. Many physiotherapists and rehab clinics use equipment strikingly similar to an Isochain for assessment. These people know what they're doing.

X. Isochain training for amplified endurance

Isometrics are used in sport to enhance static muscular endurance, for example in long-distance speed skating, where the demand for maintaining a bent-trunk posture is extremely high.

-Zatsiorsky (2016)



So far, I've presupposed that everyone who trains with an Isochain wants to build strength and muscle. Not all athletes will, however. Sports ranging from martial arts, boxing, climbing to cycling all demand high levels of muscular *endurance*. Isometric holds are obviously ideal for sports or disciplines involving static postures or body-parts, however recent studies have found that isometrics increase endurance just as well as traditional, dynamic methods (Myers, et. Al., 2015).

One mix-and-match option is to go to the gym and perform your regular workouts, but spare 2-3 sessions per week for the Isochain, to build muscular endurance. You can employ an Isochain to build endurance by setting a hold time in basic drills (100 seconds is a great start for muscular endurance) and using the console functions to measure your average work capacity. Increasing muscular stamina over time is easy, accurate and scientific. Zero guesswork.

Oh, and another benefit of longer isometric holds—they make your muscles feel denser, and "super-efficient". Just ask Bruce Lee or Steve Justa.

Well—there ya go. Just like Old Uncle Paul promised, ten sparkly ways to combine the Isochain with regular gym work, to increase strength, muscle and endurance. I could've written a dozen more—that's how versatile this kit is. The Isochain is pretty life-changing—and if I didn't mean that, I wouldn't say it. It WILL help you reach your full potential quicker than you ever could without it, and it'll do that without screwing up your joints, too...which means a lot when the training years are racking up.

Plus—it's fun as hell to use! There's nothing that pumps you up quite as much as rocking a drill you did just a few days ago, and seeing your numbers shoot up. And shoot up they do. The motivation to come back and go again next time is incredibly intense—almost addictive.

You want the ideal gift for yourself or a strength-loving friend? Here it is.

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CHAPTER 8

1. This quote is variously attributed to Peter Drucker (the famous management consultant) or Karl Pearson (the founder of mathematical statistics). It is thought to be inspired by the quote anecdotally attributed to Lord Kelvin: *If you can not measure it, you can not improve it.*

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